FALK & FISH

#51 Ltr. & Fifth Supple Statement of Prior Art

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December 8, 2000

VIA FEDERAL EXPRESS

Examiner Stephen Funk
United States Patent and Trademark
Office Group 2854
Room 9D35- Crystal Plaza IV
Arlington, VA 22202

Re: United States Serial No. 09/315,796 to Davis and Williamson
Our File: WILL 2501

Dear Examiner Funk:

Enclosed please find an original of Reissue Applicants' **FIFTH SUPPLEMENTAL STATEMENT OF PRIOR ART AND OTHER INFORMATION,** which pertains to German Gebrauchsmuster G 93 05 552.8 (U1) registered in the Federal Republic of Germany in early June of 1993, and EP 620,115 to MAN-Roland Drucksmachinen A.G., a counter-part to U.S. Patent No. 5,638,752 to Hartung, et al. which was the subject of Reissue Applicants' Third Supplemental Statement of Prior Art and Other Information. EP 620,115 was protested in the Federal Republic of Germany by German press manufacturer KVA. The instant binder contains Reissue Applicants' thoughts, the Gebrauchsmuster and its translation, two declarations of Expert Prince, and the file history of EP 620,115, including translations of the opposition portion of the file history.

Very truly yours,

Robert Hardy Falk

RHF:tsmc
Enclosure(s)

cc: William D. Harris, Jr., Esq. (w/encl.)

PATENT
Our File: Will 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of: **BILL L. DAVIS and JESSE S. WILLIAMSON**	
For Reissue of U.S. Patent 5,630,393 **Issued May 20, 1997** **Serial No. 08/515,097**	**Group Art Unit: 2854**
Filing Date: May 20, 1999	**Examiner: S. Funk**
Serial No: 09/315,796	
For: COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS	

FIFTH SUPPLEMENTAL STATEMENT
OF PRIOR ART AND OTHER INFORMATION

To: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

Reissue Applicants wish to bring to the attention of the Examiner (a) the claims of German Gebrauchsmuster G 93 05 552.8 (U1) (original German yellow Exhibit A hereto), registered June 3, 1993, said to be "laid open" July 15, 1993, and its translation (orange Exhibit B hereto), and (b) the file history of EP 620,115 to MAN-Roland Druchsmachinen A.G., related to U.S. Patent No. 5,638,752 to Hartung, et al. (the subject of Reissue Applicants' Third Supplemental Statement of Prior Art and Other Information, filed on or about September 26, 2000 incorporated herein), and the Opposition in the '115 file history by German opponent KVA, sustained at the Primary Opposition Board level on and references K1-K7 and translations as necessary cited by KVA in its opposition and supplemental opposition. A PTO-1449 form is attached.

I.

Gebrauchsmuster G93 05 552.8 (U1)

MAN-Roland Gebrauchsmuster G 93 05 552.8 (U1) was brought to Reissue Applicants' Assignee's attention on November 17, 2000. Apparently MAN-Roland in Germany filed two applications the same day in April 1993, the first cited in the EP 620,115

file history (discussed below), and the second, a Gebrauchsmuster registration (sometimes called a "petty patent"). M.P.E.P. §901.05 (1995).

A.
The U.S. Law Concerning Gebrauchsmusters

Reissue Applicants contend that if Gebrauchsmuster ("GM") G 93 05 552.8 (U1) was indeed "laid open" July 15, 1993, only *its claims* are prior art against the Davis, et al. '363 patent, as opposed to the Gebrauchsmuster's specification and drawings. The is well "Gebrauchsmuster" settled law. Max Daetwyler Corp., et al v. Input Graphics, Inc., 583 F.Supp. 446, 455, 222 USPQ 150 (E.D. Pa. 1984); Permutit v. Wadham, et al., 13 F.2d 454, 456-457 (6th Cir. 1926); Reeves Bros., Inc. v. United States Laminating Corp., 282 F.Supp. 118, 136, 157 USPQ 235 (E.D. N.Y. 1968), aff'd, 412 F.2d 869, 163 USPQ 577 (2d Cir. 1969); Bendix Corp. v. Balax, Inc., et al., 421 F.2d 809, 812, 164 USPQ 485 (7th Cir. 1970). Again, Gebrauchsmusters cannot be used as references for the disclosure in their specification or drawings.

The reason that Reissue Applicants say "if" is that there is no proof that this GM was available as of July 15, 1993, or when. But for purposes of this section, Reissue Applicants will assume it was available by microfilm as of July 15, 1993 and reserve their evidentiary rights of objection.

The reason for this restriction is that Gebrauchsmusters are not "printed publications" at any time within the meaning of the statute. In re Tenney, 45 C.C.P.A. 894, 254 F2d 619, 623-627, 117 USPQ 619 (C.C.P.A. 1958); Bendix, supra, 421 F.2d at 811-812 and cases listed therein; Reeves, supra, 282 F.Supp. at 134-135; Safety Gas Lights Co. v. Fischer Bros. & Corwin, 236 F. 955 (D. N.J. 1916). This is a well established body of law. See also M.P.E.P. §901.05(b) (1983).[1]

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[1] Standard Oil Co. v. Montedison S.p.A., 494 F. Supp. 370, 206 USPQ 676, 750 (D. Del. 1980), aff'd, 664 F.2d 356, 212 USPQ 327 (3d Cir. 1981) (foreign applications laid open to public are not printed); Carter Products v. Colgate Polmolive Co., 130 F.Supp. 557, 565-66, 104 USPQ 314 (D. Md. 1955), aff'd, 230 F.2d 855, 108 USPQ 383 (4th Cir. 1956); Ex parte Haller, 103 USPQ 332 (Pat. Off. Bd. App. 1953)

For 35 U.S.C. §102(b) foreign patent type documents have to be analyzed on a case by case basis to ascertain if the document (a) is a "*patent*" within the meaning of the law, (b) are printed, and (c) published.

In In re Tenney, et al., 254 F.2d 619, 117 USPQ (C.C.P.A. 1958), Chief Judge Johnson, speaking for a unanimous panel, reversed a decision of the PTO Board of Appeals and held that a Gebrauchsmuster was not a printed publication, citing Permutit, and wrestled with Congress' decision and the legislative history of various predecessor statutes prior to the 1952 Act's 35 U.S.C. §102(b) that foreign patents be both "printed" and published to be prior art.

> "In our analysis of the basis of the 'printed publication' bar is corrected, numerous questions arise. *If it is prior 'accessibility' to the public of the subject matter of the invention that is the essence of the bar, why have the courts and the Patent Office consistently held that *900 a foreign typewritten patent application file which has been opened to public inspection in a foreign patent office is not a bar under the 'printed publication' provisions of the current and predecessor patent acts?* De Ferranti v. Westinghouse, Jr., 1890 C.D. 114 (Commr.Pats.); Parkin and Wright v. Jenness, 1893 C.D. 64 (Commr.Pats.) Bayer v. Rice, 1934 64 App.D.C. 107, 75 F.2d 238; Ex parte Haller, 103 USPQ 332 (Bd.Appls.1953); Carter Products, Inc. v. Colgate-Palmolive Col, D.C.D.Md.1955, 130 F.Supp. 557. *Why have the German Gebrauchsmuster , which are typewritten and open for public inspection, not been applied as statutory bars under the same provision?* [FN6] Permutit Co. v. Wadham, 6 Cir., 1926, 13 F.2d 454, rehearing denied, 6 Cir., 1926, 15 F.2d 20; Permutit Co. v. Graver Corp., 7 Cir. 1930, 43 F.2d 898; Ex parte Smith, 82, U.S.P.Q. 83 (Bd.Appls. 1941).
>
> > "FN6. It is to be noted that, inconsistently with these cases, typewritten college theses placed on library shelves have been held to be 'printed publications.' Ex parte Herschberger, 96 U.S.P.Q. 54 (Bd.Appls. 1952); Gulliksen v. Halber, 75 U.S.P.Q. 252 (Bd.Appls. 1937); Hamilton Laboratories v. Massengill, 6 Cir., 1940, 111 F.2d 584.
>
> "It would seem that based upon pure logic alone, the foregoing means of accessibility to the public would be equally effective in vitiating the consideration necessary to support the patent grant as would be 'printed' publications. The answer to the foregoing questions, however, is not to be obtained by logical analysis, for as will hereinafter be shown, Congress' failure to cover this type of situation has unquestionably been due to legislative oversight or to some obscure policy not detectible on the face of the opinions considering the question nor in the volumes containing the legislative history of the 'printed publication' provision.
>
> **"It is clear, however, that the reason the foreign patent applications were not applied as bars by the courts is found in the requirement that the publication, to be a bar, must be 'printed.'** [FN7]

"FN7. The earlier decisions did not urge this as the reason, De Ferranti, Parkin & Wrighty, Ulmann and Bayer v. Rice cases, supra, but the later decisions, in which the earlier were cited, made it unmistakably clear that the applications were not 'printed' and were, therefore, not printed publications, haller and Carter Products cases, supra."

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•
•

"But though the law has in mind the probability of public knowledge of the contents of the publication, the law does not go further and require that the probability must have become an actuality. *In other words, once it has been established that the item has been both printed and published, it is not necessary to further show *903 that any given number of people actually saw it or that any specific **627 number of copies have been circulated. [FN9] The law sets up a conclusive presumption to the effect that the public has knowledge of the publication when a single printed copy is proved to have been so published.* See Evans v. Eaton, 1818 3 Wheat. 454, 514, 4 L.Ed. 433; Curtis, Law of Patents, pp. 500-03 (4th ed. 1873)

"FN9. This statement, however, presupposes publication in fact. The so-called 'publication' cannot be a private communication or the like. Dow Chemical Co. v. Williamson Bros. Well Treating Corp., 10 Cir., 1936, 81 F.2d 495; see also Jockmus v. Leviton, 2 Cir., 1928, 28 F.2d 812.

"Using the foregoing as a guide, the answer to the instant question is clear. *While microfilming furnishes a means of multiplying copies, there is no probability, from a mere showing that a microfilm copy of a disclosure has been produced, that the disclosure has achieved wide circulation and that, therefore, the public has knowledge of it. The nature of present day microfilm reproduction differs from normal printing methods. Though one would be more likely than not to produce a number of copies of printed material, one producing an item by microfilming would be as apt to make one copy as many. In the case of printing, unless a number of copies were produced, a waste of time, labor and materials would result; present day microfilming methods, on the other hand, are as well designed to produce one microfilm as well as many without waste.*

"It is no doubt true that the present law is anomalous, as evidenced by our conclusion that the microfilm is not 'printed.' A foreign patent file, laid open for public inspection, is not a printed publication, because typewritten, while a printed publication, available to the public only in a Southern Rhodesian library, would be. The former is obviously more likely to reach the eyes of the American public than the latter. It is obvious, however, that unless we are to

rewrite 35 U.S.C. 102(b) for Congress, this must be the result reached. Our job is to interpret the law, not to make it.

"For the foregoing reasons, the microfilm copy of the Karcher disclosure is not a 'printed publication' within the contemplation of section 102(b). Our conclusion that the microfilm is not 'printed' makes it unnecessary to consider whether it was published.

"In view of the concession that the claims must stand allowable if this reference is held to be of no legal effect, the decision of the board is reversed." (Emphasis supplied)

Chief Judge Johnson was joined by Judge O'Connell, Worley and Rich, Rich concurring.[2]

Under South Corporation v. United States, 690 F.2d 1368 (Fed. Cir. 1982), reissue applicants assert the Tenney and Nelson decisions concerning Gebrauchsmusters are the law of the land, and the rule of stare decisis:

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2 Judge Rich, twenty-three years later, held for another C.C.P.A. panel the "laid open" Australian application was prior art for its *entire* text. In re Wyer, 210 USPQ 790 C.C.P.A. (1981) (application microfilmed and deposited at *five suboffices* of the Australian Patent Office constitutes printed publication.) Judge Rich at no time compared the thoughts in his 1958 Tenney concurring opinion with his 1981 thoughts, stating that:

> "While intent to make public, activity in disseminating information, production of a certain number of copies, and production by a method allowing production of a large number of copies may aid in determining whether an item may be termed a 'printed publication,' they are neither always conclusive nor requisite. Each case must be decided on the basis of its own facts. *Accordingly, whether information is printed, handwritten, or on microfilm or a magnetic disc or tape, etc., the one who wishes to characterize the information, in whatever form it may be, as 'printed publication'*
>
> *" • • • should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to persons concerned with the art to which the document relates and thus most likely to avail themselves of is contents.* [Philips Electronic Corp., supra at 1171, 171 USPQ at 646]
>
> "Through demonstration of the accessibility of reproductions of appellant's application in the Australian Patent Office and in each of its sub-offices, the PTO has met this burden." (Emphasis supplied)

210 USPQ at 795. *The Wyer panel, besides not expressly repudiating Tenney, distinguished Tenney on the grounds the GM microfilm was available in only one German office, while the Australian "laid open" publication was available in five.* As stated by the Northern District of Illinois, "It is an open question, which must be determined on the specific facts of each case, whether a foreign application that is available to the public is a printed publication under 35 U.S.C. §102(b)." Abbot Laboratories v. Diamedix Corp., 969 F.Supp. 1064, 1067 n.2, 43 USPQ2d 1448, 1450 n.2 (N.D. Ill. 1997). Note also Siemens-Elema AB v. Puritan-Bennett Corp., 13 USPQ2d 1804, 1806 (S.D. Calif. 1989) ("The application for the Swedish patent was available to the public *upon request* after February 3, 1969, which is more than a year before the application for the patent in suit was filed.") ; Scheller-Globe Corp. v. Milsco Mfg. Co., 206 USPQ 42 (E.D. Wis. 1979) aff'd 636 F.2d 177, 208 USPQ 553 (7th Cir. 1980) (prior art includes patentee's Belgian patent placed in public reading room and Netherlands patent application laid open to public inspection, both more than one year before applicant's effective filing date in the United States.) and In re Carlson, 983 F.2d 1032, 25 USPQ 1207 (Fed. Cir. 1992) (German *Geschmacksmuster* is a "patent" for purposes of 35 U.S.C. §102(a) and §102(b))

> "The great principle, stare decisis, so fundamental in our law, and so congenial to liberty, is particularly important in popular governments, where the influence of passions is strong, the struggles for power are violent, the fluctuations of party are frequent, and the desire of suppressing opposition, or of gratifying revenge under the forms of law and by the agency of the courts, is constant and active.

Ex parte Bllman, 4 Cranch 75, 89, S. L Ed.554, 559 (1807)

Gebrauchsmusters are "petty patents", as registered, and are not subject to examination for inventive height/obviousness. Reeves. They can cover only articles, and not processes. Id. citing at 137, Nelson v. Wolf, 25 C.C.P.A. 1290, 97 F.2d 632 (C.C.P.A. 1938).

Some cases hold that the specification of a Gebrauchsmusters can be referred to in order to interpret the claims. Bendix, supra, 421 F.2d at 813-814; Max Daetwyler, supra, 583 F.Supp. at 455.

White Gebrauchsmusters are not publications, they are indexed, the index is published, and copies of the GMs are available to the public on request. General Tire and Rubber Co. v. Firestone Tire and Rubber Co., 349 F.Supp. 345, 355 (N. Ohio 1972), citing Permutit, supra, 13 F.2d at 458 and Bendix, supra, 421 F.2d at 811-812. Notice in the German patent Blatt (similar to a U.S. Patent and Trademark Office Gazette) of the registration of a Gebrauchsmusters is under U.S. law itself and is not a description in a "printed publication". Safety Gas Lighter Co. v. Fischer Bros. & Corwin, 236 F. 955 (D. N.J. 1916).

Finally, it is well settled that disclosure in foreign patented art, whether or not printed, are strictly construed and are restricted to what is clearly and definitely disclosed therein. National Latex Products Co. v. Sun Rubber Co., 274 F.2d 224, 236 (6th Cir. 1959); Morgan Construction co. v. Wellman-Seaver Morgan Co., 18 F.2d 395, 399 (6th Cir. 1927); General Tire and Ruber Co. v. Watson, 184 F.Supp. 344, 354 (D. D.C. 1960); General Tire and Rubber Co. v. Firestone Tire and Rubber Co., 349 F.Supp. 345, 357 (N.D. Ohio 1972).

B.

Claims 5-6 of GM '552

Reissue Applicants maintain that the only relevant claims of the Gebrauchsmusters G 93 05 552.08 (U1) are claims 5-6 bolded below, said to be dependent on claims 1-2 (which are end-of-press claims).

> **1.** Device preferably in sheet-fed rotary printing presses for multi-color offset printing for the coating of materials to be printed containing at least two lacquering stations whereby each lacquering station comprises one impression cylinder (8), one form cylinder (10), and one applicator roller (11, 14), and the lacquering station that is upstream with respect to the sheet running direction is configured as a flexographic stations (6).
>
> **2.** Device according to claim 1 wherein the flexographic station (6) is equipped with an applicator roller (11), with which is associated an adjustable chamber doctor (12), whereby the applicator roller (11) is configured as an anilox roller.
>
> **5.** **Device according to claims 1 and 2 wherein the flexographic station (6) in an offset printing press is placed in between the printing stations (-15).**
>
> **6.** **Device according to claims 1 and 2 wherein the flexographic station (6) in an offset printing press is placed upstream of the printing stations (1-5).**

C.
Claims 5-6 of GM '552 Do Not Anticipate
or Make Obvious Any of the Pending Reissue Claims

Reissue Applicants assert that Claims 5-6 of GM '552, Fig. 2 and the short supporting text clearly were derived from Jesse Williamson and his trip to MAN-Roland at the end of May 1992. See Reissue Applicants's Third Supplemental Statement of Prior Art and Other Information, filed September 26, 2000, and ¶11, Sixth Supplemental Declaration of Raymond J. Prince, light red Exhibit "C" hereto.

Prince points out in his Sixth Supplemental Declaration numerous disclosure difficulties of GM Claims 5-6, whether or not interpreted in view of the specification, and concludes that Claims 5-6 do not put Reissue Applicants' claimed invention in possession of the artisan, or made obvious said claimed invention:

> "I further understand that Gebrauchsmusters are available as foreign patents under 35 U.S.C. §102(b) if timely available, and if the Gebrauchsmuster G 93 05 552.8 was available to be

ordered on July 15, 1993, its claims – and its claims only – would be prior art to U.S. Patent No. 5,630,363. I also understand that some case law exists in the United States that while the specification and drawings of Gebrauchsmuster G 93 05 552.8 are not available as prior art, under such case law one may use the specification and drawings to fairly interpret the meaning of any relevant German claims. I understand that processes cannot be claimed in German Gebrauchsmusters. *I have been asked to give my opinion if any of the claims of the Gebrauchsmuster meet the claim limitations of any of the claims of the pending reissue application or the issued '363 patent or put one of ordinary skill in the art in August 1995 in possession of the claimed invention of Claims 1-87 of the pending reissue application (Exhibit "F" hereto), or make the subject matter of these claims obvious to one of ordinary skill in the art.*

"I interpret Claims 1-4 and Claim 7 pertain to an article of manufacture ("device") with an end-of-press tower coater. I interpret Claims 5-6 as possibly referring to a device having an interstation or upstream tower coater. Of particular interest is the alternative of Claims 5 or 6 dependent on Claim 2, as opposed to Claim1. I have reviewed Exhibit "A" and "B" [hereto to Prince's sixth declaration] and would like to make the following comments to the document, and specifically comment on Claims 5 and 6.

"For the reasons that follow, none of the proposed reissue Claims 1-87 nor the underlying claims of the '363 are fairly taught by Claims 5-6 of the Gebrauchsmuster, or are obvious to one of ordinary skill in the art in view of said Claims 5-6 of the Gebrauchsmuster, whether or not the specification is available for interpretation of the claims.

"First, the Gebrauchsmuster does not mention its application to the printing of metallic inks, and does not contain the text of the WIMS patent, U.S. Patent No. 5,370,976 to Doughty and Williamson, that would supply the motivation needed in the period of July 1993 - August 1995 for one to try going "up front" with a tower coater. The Gebrauchsmuster does not indicate the use of metallic inks in front of the lithographic unit.

"Second, no detail is made of flexographic inks or plates. *Indeed, Claims 5-6 do not mention an expected advantage of printing metallic inks (increased brilliance) or any other advantage. In fact, the Gebrauchsmuster does not describe the use of flexographic plate for the purpose of printing dots in front of the lithographic units.*

"Third, there is no mention of half-tone printing, only flood (possibly spot) coating of opaque whites. The Gebrauchsmuster (See Exhibits "A" and "B" [hereto]) does state the up front units will be used for printing opaque white. This is normally done for the reason of printing process color on metalized foil. What is done is to lay white and then print process color via lithography on top of the opaque white.

"*Fourth, Claims 5-6 and the underlying specification do not teach, let alone mandate, interstation drying.* In fact, the Gebrauchsmuster does not indicate how one would dry the flexographic ink prior to printing lithographic ink on tope of it. The mention of drying in the last paragraph is simply insufficient. *If attempted to be practiced on the opaque white mentioned in the Gebrauchsmuster, such a press containing an interstation flexographic tower would produce disastrous results – a mess. As applied by the device described in the Gebrauchsmuster, the process of Claim 5 or Claim 6 would be inoperable.*

"***With the foregoing difficulties, including the lack of a teaching equivalent to WIMS '976 and the lack of a sufficient teaching of interstation drying, the Gebrauchsmuster does not place Claims 1-87 of the pending reissue application in possession of one skilled in the art as of August 1995, let alone July 1993.*** Said another way, if one were to read the Gebrauchsmuster claims in July 1993 or August 1995, one of skilled graphic arts knowledge would not be in possession of the Davis-Williamson '363 invention." (Emphasis supplied)

For the reasons indicated, GM 93 05 552.8 (U1) does not bar the patentability of any of the claims undergoing reissue.

D.
German Patent Agent, Lars Manke "Expert" Report Does Not Alter the *Tenney* or *Nelson* Decisions

Protester PRI recently filed an "expert" report by a German patent agent, Lars Manke, who was not even registered before the German Patent and Trademark Office when Gebrauchsmuster G 93 05 552.8 (U1) was ostensibly registered in June 1993. Manke is not a lawyer. Reissue Applicants object to his testimony as hearsay and to his status as an expert on German patent law. Manke has no personal knowledge of the handling of G 93 05 552.8 (U1) with the German Patent Office, or personal knowledge as to its availability to the public in 1993-1995.

Furthermore, Manke's declaration tells us nothing new.

1. The German Patent Gazette (Patentblatt) and the Unofficial Utility Model Bulletins are not Printed Publications Under U.S. Law

Manke first testifies:

> "In general, German utility models (Gebrauchsmuster) are similar to German patents. Like German patents, a German utility model contains a description, claims and drawings (no abstract is required). The maximum lifetime of a German utility model is 10 years, instead of 20 years for a German patent. Further, the definition of "inventive step" is slightly different.

> "Contrary to a German patent, a German utility model does not go through substantive examination but is registered upon passing the formal examination. Usually, the registration occurs between two and three month after the date of filing. The date of registration is published in the official PATENT GAZETTE (Patentblatt) and in the unofficial UTILITY MODEL BULLETIN (Auszüge aus den Gebrauchsmustern).
>
> "The publication of the unofficial UTILITY MODEL BULLETIN occurs on the same day the registration of the utility model is published in the official PATENT GAZETTE.
>
> "The publication of the registration of a German utility model in the official PATENT GAZETTE does not contain explicit details on the subject matter of the utility model; it shows the bibliographic data. The PATENT GAZETTE is the official publication of the German Patent and Trademark Office, and is printed by a publisher (Carl Heymanns Verlag) in Munich.
>
> "The unofficial UTILITY MODEL BULLETIN is printed and published by another publisher (WILA Verlag) in Munich. The UTILITY MODEL BULLETIN contains more detailed information, i.e. a drawing and claim 1 of the respective utility model.
>
> "Generally, both publications may be ordered directly from the publishers by any third party for whichever purposes. The PATENT GAZETTE is printed with a volume of approximately 700 copies per week, the UTILITY MODEL BULLETIN only with a volume of approximately 80 per week.
>
> "The unofficial UTILITY MODEL BULLETIN is available to the public through at least the German Patent Office, through the 'Bayrische Staatsbibliothek' (German Library) in Frankfurt. Further, about 60 to 70 companies and law firms order the UTILITY MODEL BULLETIN for own inspection purposes.
>
> "The official PATENT GAZETTE is available to the public through several universities and other institutions who order the PATENT GAZETTE for own inspection purposes."

Under <u>Safety Gas Lighter Co.</u>, <u>supra</u>, neither the German Patent Office Gazette nor Utility Model Bulletin are printed publications.

We do agree with Manke that Gebrauchsmusters are "petty patents" with short lives, undergoing no substantive examination.

2. Manke's Testimony as to Availability is <u>Hearsay Testimony on the Part of a Novice</u>

Manke next testifies:

"The German utility model G 93 05 552.8 with the German title "Einrichtung zum Inline-Beschichten von Bedruckstoffen in Offsetdruckmaschinen" (English title: "Device for in-line coating of printed materials in printing machines") has been filed on April 16, 1993. The date of registration was June 3, 1993. The registration has been published in the official PATENT GAZETTE and in the unofficial UTILITY MODEL BULLETIN on July 15, 1993.

"From the date of the registration (June 3, 1993) of the above German utility model, a list was available at the German Patent Office, on which the publication number, the main class and the date of registration of all German utility models are cited which have been registered at that day (June 3, 1993) including the publication number, the main class and the date of registration of the utility model in question.

"From the above date of registration, any third party had the opportunity to file a request for inspection of file for the utility model in question. This means, from the date of registration (June 3, 1993), any third party had the opportunity to get knowledge of the content of the above utility model in question.

"As already mentioned, the publication of the registration of a German utility model in the official PATENT GAZETTE and the unofficial UTILITY MODEL BULLETIN occurs a few weeks after the registration thereof. This date of the publication of the registration (June 3, 1993) was the day when the above utility model was open to the public and could be inspected by any third party. <u>There is no printed copy of the German utility model, but is on microfiche.</u> However, any third party had the opportunity to order a printed copy of the whole specification of the above utility model from the German Patent and Trademark Office." (Emphasis supplied)

Manke testifies about events in the German Patent Office three years before he was licensed to practice as a patent agent. He does not testify about how he <u>personally</u> could know <u>when</u> the file was "laid open".

Purported microfiche availability from a single German office is insufficient even if it were available. <u>Tenney</u>

3. <u>Manke is Not a German Patent Law Expert</u>

Manke finally states:

"The above declaration and any opinions herein are based on my knowledge of the German utility model law ("Gebrauchsmuster-gesetz"), my experience as a German patent attorney, my German patent practice, my knowledge of the German Patent Office and my knowledge of Carl Heymanns Verlag and WILA Verlag. I have not testified or given a deposition for the last four years.

> "Attachments to this report are German utility model G 93 05 552.8, the mention of registration of the utility model in the PATENT GAZETTE and the unofficial UTILITY MODEL BULLETIN published July 15, 1993. It is expected that an English translation of the German utility model G 93 05 552.8 will be available in a supplement."

Four-year German agent associate Manke, from his resume, never attended law school, has obviously never tried a patent case in Germany, and became a partner at the agents' firm of Üekull & Stolberg since the inception of this suit. His testimony concerning G 93 05 552.8 is hearsay, and he is not qualified to testify as an expert under either U.S. law or German law. Manke's testimony is excluded under F.R. Ev. 602, 701, 802-803.

II.

<u>The File History of EP 620,115, the KVA Opposition and Cited Art K1-K7</u>

A.

<u>EP 620,115 and the KVA Opposition</u>

EP 620,115 is the counterpart of Hartung '752, but does not contain Fig. 2 of the '752 and has a shorter text. Expert Ray Prince has reviewed the file history and exhibits K1-K7 submitted by opposer KVA, and has provided his testimony in Fifth Supplemental Declaration, <u>dark red Exhibit D</u> hereto:

> 1. Device in a rotary printing press for multi-color offset printing for coating material to be printed with at least two varnishing units, wherein each varnishing unit has an impression cylinder (8), a forme cylinder (10) and an applicator roller (11, 14) and the varnishing unit arranged upstream corresponding to the sheet running direction is constructed as a flexo print unit (6), wherein the flexo print unit (6) consists of the following elements:
>
> a relief form carrying forme cylinder (10.1) which is in contact with the impression cylinder (8.1), an applicator roller (11) with a raster structure, which is in contact with the forme cylinder (10.1) and a settable-on chamber doctor (12) which is connected with a feed pump for liquid feed and a suction pump for liquid return wherein directly or indirectly arranged after the flexo print unit (6) is a varnishing unit (7) and wherein in the varnishing unit (7) an applicator roller (14) is provided relative to which a metering roller (13) is arranged to form a common metering slot.
>
> **2. Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press between the printing units (1-5).**

4. Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press subsequent to the printing units (15).

The file history of EP 620,115 is set forth in <u>Exhibit E</u> and contains Tabs 1-20, followed by Tabs K1-K7 for the KVA cited references:

K1 = copy from the magazine "*Offsetpraxis*", 3/1993, pages 12-15

K1a = Enlargement of an illustration of copy K1

K2 = US=A-5 176 077

K3 = Copy from the reference book: "*Flexodruck von Abis Z*[4]", Cover page, masthead, page 160

K4 = "*Druckindustrie*" 9001 ST. Gallen, No. 5, Mar. 11th 1993, "*Nach Golde drängt, am Golde hängt doch alles . . .*", Title page, masthead, pages 22 and 23

K5 = DE-A-4 122 990

K6 = EP-A-0 499 382

K7 = Magazine: "*FlexoDruck*", 2-93, pages 42-43, "*Goldlackdruck löst Metall-Bronzierung ab*[5]"

The Opposition portion of EP 620,115 (<u>purple Exhibit E</u>, Tabs 13-20) are translated. EP application 94103832.5 was filed on March 12, 1994 (Tab 1) to MAN-Roland and claimed priority based on G 93 05 552.8 (U1) (Tab 4). A second report followed on August 19, 1994 (Tab 6) after a first office action and response (Tab 7) and second office action and response (Tab 8), the four claims, as amended (Tab 10), and translated into French and English (Tab 11) were sent to publication (Tab 12) on March 13, 1997 and the EPO patent was granted as EP 620,115.

A KVA opposition was mailed on January 22, 1998 seeking to revoke EP 620,115 in its entirety, citing references K1-K3 (Tab 13). Applicant MAN-Roland responded and a letter exchange followed (Tab 14). After the opposition division gave its preliminary opinion (the opposition would probably be rejected), (Tab 15), Opponent KVA cited new art K4-K7 on April 27, 1999 (Tab 18) and made more arguments against Claim 1.

B.

EP 620,115 was Revoked

The Opposition Division, on August 25, 1999, decided to revoke EP 620,115 (purple Exhibit E, Tab 19). **The primary thrust was on examination of Claim 1 – directed to an end-of-press coater, rather than Claim 2-3, which were not emphasized by applicant:**

> 3. Inventive step
>
> 3.1 *In the opinion of the Opposition Division, the subject matter of the independent claim 1 does not contain any inventive step within the meaning of article 56 EPC.*
>
> 3.2 After careful examination of all documents involved in the opposition proceedings, the Opposition Division reaches the conclusion, in agreement with the opponent, that the document K1 (magazine: "Offsetpraxis") is to be seen as the closest related state of the art.
>
> 3.3 Documents K1, Kl a, K4, and K7:
>
> 3.3.1 Based on the agreeing opinion of both parties, the Opposition Division determines that the following feature of the contested claim I is already described in document K1:
>
> "Device in a rotary printing press for multi-color offset printing for coating materials to be printed with at least two coating units, whereby each coating unit comprises one impression cylinder (8), one form cylinder (10), and one applicator roller (11, 14), and the coating unit, upstream with respect to the sheet running direction ... is constructed, whereby ... a coating unit (7) is arranged directly or indirectly downstream, and whereby in the coating unit (7) an applicator roller (14) is provided, which is associated with an adjustable metering roller (13) to form a common metering slot."
>
> The opponent could give primafacie evidence, that the multi-color offset rotary printing press "Filriffarben Roland 700", which is illustrated explicitly in the document K1, e.g. by means of a schematic drawing on page 13, also see document K1 a, and which was presented to experts during the course, of a socalled presentation in the Druckerei Busche in Dortmund (DE), contained two coating units, both of which were constructed with one form cylinder and a double-roller unit as a metering system for coating.
>
> The same special embodiment of the presented printing press is seen in the schematic drawing in document K4.
>
> 3.3.2 Contrary to the argument by the proprietor, in addition to this, the document K1 discloses to a person skilled in the art the following, additional features of the contested claim 1:
>
> "... the coating unit, upstream with respect to the sheet running direction, is executed as a flexo print unit, whereby the flexo print unit consists of the following elements:

a relief form carrying f6rm cylinder (10.1), which is in contact with the impression cylinder, an applicator roller (11) with raster structure, which is in contact with the form cylinder (10. 1), and an adjustable doctor blade chamber (12) ... whereby a coating unit (7) is located downstream of the flexo print unit ...

Even if the actually presented multi-color offset printing press did not possess a coating tower with flexo printing plate and doctor blade chamber, every person skilled in the art can learn explicitly from the text of each of the submitted documents K1, K4, and K7, that it is possible to apply a special gold- or silver printing ink, which is based on an aqueous fixing agent or is water-soluble, onto a material to be printed by means of a flexo printing plate, see for example document Kl, page 13, left column, second paragraph - page 14, right column, document K4, page 22, right column, penultimate paragraph - page 23, right column line 4, as well as document K7, page 42, left column, first paragraph, middle column, second paragraph, and page 43, middle column~ first paragraph.

3.3.3 In addition, each of the documents K1 and K7 describes a doctor blade chamber system with anilox roller as an ink feed system for the plate cylinder that is equipped with a flexo printing plate. In particular from Document K7, a person skilled in the art obtains the statement that the final version of the presented multicolor offset printing press will comprise an anilox roller and a doctor blade chamber system, which was not installed in the actually presented machine only due to time limitations, see document K7, page 43, middle column, first paragraph. Document K4 only discloses a short inking attachment with anilox roller.

3.3.4 Both documents K1 and K4 directly and unambiguously state that at first the gold- or silver printing ink on a water basis is applied to the material to be printed by flexo printing, and only afterwards, i.e. downstream in sheet running direction, a conventional coating unit, i.e. e.g. as installed in the presented printing press, is used to apply a so-called overprint coating or dispersion coating, see for example document K1, page 14, middle column, last paragraph, and document K4, page 22, right column, penultimate paragraph, and page 23, left column, second paragraph, and right colunu-4 first paragraph. Document K7 does not state anything relevant to this matter.

3.3.5 In consideration of the arguments presented by both parties, the subject matter of the independent claim 1 is different from the technical teaching of document K1 only in the following features:

(a) "...doctor blade chamber (12), which is connected with a feed pump for liquid feed and with a suction pump for liquid return ..."

3.4 Thus, the published state of the art defines the problem of enabling the inline processing of quickly-evaporating, aqueous printing inks or printing coats with high

pigment content or rough pigments in a simple manner, see patent specification, column 1, lines 47-51.

3.5 Based on the disclosure of document K1 illustrated above, the Opposition Division sides with the opinion of the opponent, that the object of the disputed patent is to improve the per se known doctor blade chamber system with anilox roller in such a way, so that a problem free transport of aforesaid special printing inks or printing coats can take place within the per se known doctor blade chamber system of a per se known flexo print unit within a multi-color offset rotary printing press.

3.6 Documents K2 and K6:

3.6.1 Both, the document K2, see e.g. column 2, lines 22-38, column 8, lines 37-52 and figures 1 and 2, and the document K6, see e.g. column 2, lines 3 -10, column 7, line 42 - column 8, line 14, and figures 1 and 2, not only clearly and directly described the feature (a) of the contested claim 1, which was mentioned above in item II 3.3.5, but also the exact reason why a feed pump is provided for liquid feed, and a suction pump is provided for liquid return. Both of the known devices must be suitable for the problem-free transport of aqueous, quickly evaporating flexo printing inks, whereby document K6 explicitly names pigment particles in inks or coatings of that type.

3.6.2 In view of the above mentioned object it is evidently obvious for a person skilled in the art to either install the ink pumps according to document K2, or the ink pumps according to document K6, into the doctor blade chamber system according to document K1, since he can learn from each of the two documents K2 and K6 independently how the aforesaid special problematic printing inks can be transported problem-free within the doctor blade chamber system. Hereby it is irrelevant for the present definition of the object, whether one deals with a pure flexo printing press without reference to an offset printing press as in document K6, or, as in document K2, with a flexo printing plate cylinder with the added function of a sheet transport cylinder or a type of satellite printing unit with respect to the counter pressure cylinder "(36)" of figures 1 and 2 of K2. Contrary to the arguments of the proprietor, the Opposition Division can not see how a person skilled in the art could be led away from the contested invention by the technical teaching of the documents K2 or K6. Through the identical problem definition in K2 and in K6 with respect to the stated problem definition of the disputed patent, the person skilled in the art almost receives a direct tip to install the ink pumps described in K2 and K6 to solve his task in the doctor blade chamber system inside a multi-color offset printing press of document K1.

3.6.3 Thus, the subject matter of the contested claim 1 follows in a manner that is obvious to a person skilled in the art.

3.7 Thus, the Opposition Division reaches the conclusion, that the subject matter of the independent claim I of the

disputed patent with respect to the published state of the art, in particular with respect to a combination of the document K1, combined either with the document K2 or combined with the document K6, does contain no inventive step in the sense of article 56 EPC.

3.8 The Opposition Division considers the remaining documents K3 and K5 mentioned in the course of the opposition proceedings as less relevant for the assessment of an inventive step, and cannot show a lack of an inventive step of the independent claim 1 by either considering each of the documents on its own, or by considering them in any combinations with each other, or with the other documents K1, K2, K4, K6, and K6, which were mentioned in the opposition proceedings.

3.9 Dependent claims 2-4:

In view of the present lack of an inventive. step of the independent claim 1, *and the fact that no motion by the proprietor is at hand to include any features of any dependent claim into the independent claim, there exists no need for a careful examination of the inventive steps of the claims 2 - 4 in question.*

6. The opponent and the proprietor were given the opportunity to express their opinion in the sense of article 113 (1) EPC with respect to all grounds on which the present decision is based.

7. Since the independent Claim 1 in the granted version of the disputed European patent No. 0 620 115 does not meet the requirements of articles 52 and 56 EPC (Inventive step), due to the above mentioned grounds, the European patent had to be revoked in the sense of article 102(l) EPC. (Emphasis supplied)

Reissue Applicants will not comment here about the propriety under U.S. law of combining K1, K2, K4, K6 and K7 under 35 U.S.C. §103 to render an equivalent claim unpatentable. However, it is clear that neither the opponent KVA, Applicant MAN-Roland, nor the Board put any emphasis on any of the dependent claims. MAN-Roland rose or fell on Claim 1, covering their Roland 700 press.

C.

<u>Prior Art K1-K7 is Immaterial to the '363</u>

Reissue Applicants took the opportunity of having expert Prince review K1-K7, and where necessary, translations thereof, and Prince concluded (Fifth Supplemental Declaration, <u>dark red Exhibit D</u>) that K1-K7 did not teach the Davis/Williamson '363 process or make same obvious:

"2. I have had the opportunity to review translations of the opposition portion of the file history of EP 630,115, the counterpart of Hartung et al., U.S. Patent No. 5,638,752, the subject of the testimony of one of my previously filed declarations. *In particular, I note Tab 19 of the '115 prosecution history and the August 25, 1999 Decision of the European Patent Office to revoke the '115 patent, and in particular 3.3.4 of that decision regarding dependant claims 2-4.* I have read each of references K1-K7 listed at page 4 of the English translation of the Decision, giving special emphasis to K1 and K4.

"3. None of references K1-K7 teach the use of flexography "up front" for a lithographic press as taught or claimed in the Davis and Williamson '363 patent.

"(a) with respect to the German "Offsetpraxis" trade article "K1" (translation) published March 1993, the article states unequivocally that coating is <u>after</u> the printing (paragraph 1, translation). **All that is described is a prototype MAN-Roland Model 700 press with a double tower coater end-of-press, which model commenced to be sold to the public in September 1993 with the IPEX Exhibition.**

"(b) With respect to "Druckindustrie" K4, the article says (translation) "They demonstrated the inline-printing of gold using a relief process, subsequent to multi-colored offset printing. This abolishes the need for offline-bronzing." **Such a teaching eschews the method of the Davis and Williamson '363 patent.**

"4. **None of references K2, K3 or K5-K7 teach the '363 patent process either.** K2 is the first of the DeMoore et al. "EZ" coater patents, which pertains to a cartridge coater end-of-press. This was a failed device commercially. K3 is a German dictionary with acceptable definitions; K5 is the Michael Huber (München) patent which is a teaching for a two-part water dilutable gold ink, possibly a flexographic ink. K6 pertains to a method of keeping an even pressure of a doctor blade on an anilox roller. Neat invention if it works! K7 is the early 1993 press release, like K1, for MAN-Roland 700 prototype machine with a double tower coater.

"5. **I have read the translation of EP 620,115, which is even shorter than its U.S. counterpart, U.S. Patent No. 5,638,752. It does not enable one of ordinary skill in the art to practice the '363 process.** It even leaves out Fig. 2 of the '752 patent. Like the '752, it also left out the embodiments in U.S. Patent No. 5,476,042, based on the July 22, 1993 German patent application 43 24 631.1

In a nutshell, EP 620,115, the combined teaching of K1-K7 put someone into possession, if at all of the MAN-Roland Model 700 machine marketed at the IPEX Exhibition September 1993, the press announcement in 1993 concerning same, and some information concerning chambered doctors and anilox rollers.

A suitable PTO-1449 form is attached for GM 93 05 552.8 (U1), EP 620,115 and K1-K7.

III.

The Claims of the Pending Reissue Application are Allowable Under 35 U.S.C. §103 Over Claim 5-6 of the Gebrauchsmuster, Alone on in Combination with the Entire Text and the Other References of Record

The G 93 05 552.8 article claims by definition cannot anticipate Reissue Applicants' *process* claims. Moreover, Gebrauchsmuster G 93 05 552.8 (U1) *article* Claims 5-6 and its supporting text fail to mention in 1993 metallic inks, interstation drying or why the artisan would want to have a flexographic coater up front to solve any particular problem. Besides being inoperable in view of the lack of an adequate teaching of interstation drying, Fig. 2 and the brief mention of "up front" deployment of a coating tower seem to be an afterthought. Lacking the mention of a problem to be solved, the artisan would simply ignore the language on page 4 of the specification, Fig. 2, Claims 5-6 and move on.

In view of the foregoing inoperability and lack of enablement problems, compounded by the law narrowly construing foreign patents, the reissue claims are seen as being clearly allowable over the 1993 Gebrauchsmuster.

Respectfully submitted,

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ATTORNEY FOR PETITIONERS BILL L. DAVIS AND JESSE S. WILLIAMSON

CERTIFICATE OF SERVICE

This is to certify that the foregoing Reissue Applicants' Fifth Supplemental Statement of Prior Art and Other Information was served on '363 Protestors' and '713 Patentees' counsel of record via hand delivery on the 8th day of December, 2000, addressed as follows:

William D. Harris, Jr.
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K1/K1A

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

K1 = Offsetpraxis 3/1993 pages 12-15
K1A = enlarged detail of page 13 of K1

Ch. König

(Christian König)

OFFSETPRAXIS

AKTUELL

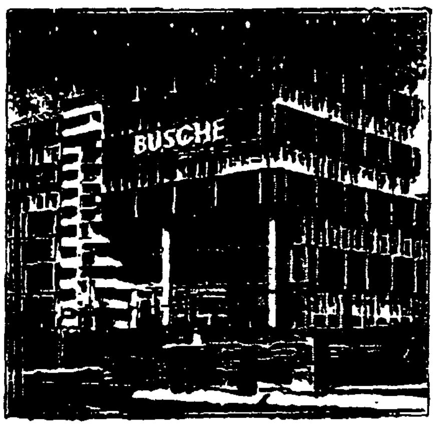
BOGENOFFSET
VERFAHRENSTECHNIK

„Goldgrube"

Busche zeigt Innovation für den Offset in Dortmund

Nahezu zeitgleich wurde Ende Januar bei der Druckerei Busche in Dortmund auf dem Stuttgarter Druckforum ein neues Golddruckverfahren vorgestellt. Es basiert auf der Verwendung von Offsetgoldfarbe auf der Grundlage wässriger Bindemittel und wurde gemeinsam von der Busche Unternehmensgruppe, der Farbenfabrik Michael Huber München, der DuPont de Nemours (Deutschland) GmbH sowie der MAN Roland Druckmaschinen AG, Offenbach entwickelt. Die Dortmunder Premiere hat für die OP-Leser Ing. Wolfgang Walenski beobachtet.

Ende Januar lud die Druckereigesellschaft Busche, Dortmund, unter der eher schlichten Überschrift „Dialog in Gold" zu einer internationalen Pressekonferenz ein. Der Dialog war aber alles andere als schlicht. Denn dahinter verbarg sich eine Innovation, die der Offsetwelt wieder neue Impulse geben und deren Marktanteil nicht nur sichern, sondern für die Zukunft auch erweitern wird. Es ging bei dem „Dialog in Gold" um eine Technologie, bei der nach dem mehrfarbigen Offsetdruck Inline im gleichen Arbeitsgang ein wirtschaftlicher, aber hochqualitativer Golddruck in einer bisher in dieser Technik nicht erreichten Brillanz praktiziert werden kann. Das „neue Gold" wurde bei Busche vorgestellt als Gemeinschaftsentwicklung des Hauses Busche mit MAN Roland und der Druckfarbenfabrik Michael Huber. Dabei ist der Kernpunkt der „Innovation durch Partnerschaft" das angemeldete Verfahrenspatent von *Klaus Rietzler*, dem Leiter der Entwicklungsabteilung „Verfahrenstechnologie" im Hause Busche und *Andrea Heinemann*, Abteilung „Produktentwicklung" bei Michael Huber München.



Bevor der Verfasser das Interesse der Fachleute auf die technischen Aspekte der neuen Goldära des Offsetdrucks lenkt, soll auf die einführenden Referate eingegangen werden, die den Dortmunder Praxisvorführungen auf einer Fünffarben Roland 700 vorangestellt wurden. *Dr. Andreas Altmeyer*, Sprecher der Geschäftsführung der Busche Unternehmensgruppe, machte in seinen Ausführungen deutlich, daß die Druckbranche gekennzeichnet ist von einer rasenden Entwicklung technologischer Möglichkeiten, und die wandelnden Märkte zu innovativem Denken und Handeln gezwungen sind, verbunden mit der Berücksichtigung des Umweltschutzes. Vor diesem Hintergrund habe sich Busche schon frühzeitig entschlossen, ni nur ein offensives Umweltkonzept praktizieren, sondern zusammen n dem hervorragenden Wissen der Mit beiter auch in neue Technologien, M schinen und Anlagen zu investier Dies führte in Zusammenarbeit n MAN Roland und Michael Huber z Entwicklung eines weltweit einmalig neuen Golddruckverfahrens für den B genoffsetdruck. Denn nach wie vor si Gold- und Silbereffekte auf Verpacku gen oder Etiketten mit hohem Glanz u hoher Brillanz zur Unterstreichung d Wertigkeit einer Ware von großer Wic tigkeit. Metallische Effekte von hoh Qualität ließen sich bisher nur im Tie druck mit lösemittelhaltigen Farben, i kostenintensiven Heißfolienprägedruc oder mit der aufwendigen Bronzierun in einem separaten Arbeitsgang bewält gen. Dr. Altmeyer bezeichnete Klau Rietzler, den Leiter der Entwicklungsab teilung „Verfahrenstechnologie" als de Vater einer im Hause Busche erarbeite ten Technik, eine Golddruckfarbe a den Druckbogen zu bringen, die fast a die Qualität der traditionellen, klass schen Bronzierung heranreicht. Das e folgt nicht etwa in einem separate Druckvorgang, sondern als Inline-Fer gung zusammen mit dem Farbdruck Sehr hilfreiche Unterstützung fand ma bei dieser mehrjährigen Entwicklungsar beit bei der Druckfarbenfabrik Michae Huber, die Golddruckfarbe auf einem wässrigen Bindemittelsystem aufbaute und bei MAN Roland, wo ein spezielle Lackmodul für die neue Goldtechni entwickelt wurde und im Hause Busch als Weltneuheit – in Verbindung mit ei ner Roland 705 – präsentierte.

Dr. Altmeyer nahm die Weltpremiere de neuen Goldgeneration zum Anlaß, auch die anderen Umweltaktivitäten als Be standteil der Unternehmensphilosophie kurz darzustellen. Man möchte Zeichen setzen, und richtungsweisend auch für andere Unternehmen sein. So wurde die moderne thermische Nachverbrennungsanlage für den Rollenoffsetdruck erwähnt und die Mitwirkung bei der Anfertigung eines Leitfadens für ein betriebliches Abfallwirtschaftskonzept und für eine Abfallbilanz durch das Schweizer Prognos Institut, im Auftrag des nordrheinwestfälischen Ministeriums für Umwelt, Raumordnung und Landwirtschaft. Inzwischen ist dieser Leitfaden vom Ministerium in Umlauf gebracht worden. Busche hat dazu ein spezielles EDV-Programm entwickelt, das zusammen mit einem Handbuch auf einer Diskette bei der Busche Verlagsgesellschaft gegen eine Schutzgebühr bezogen werden kann.

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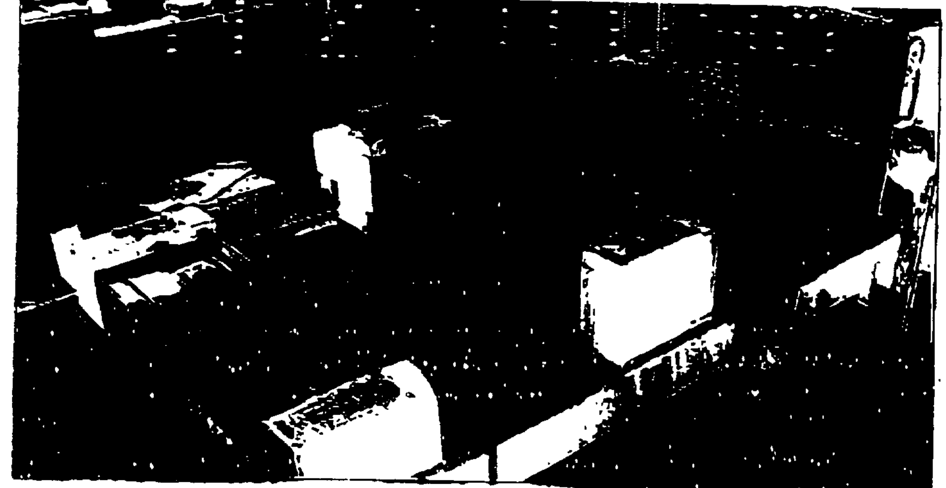
Hohe Priorität hat aber nach wie vor auch die Qualität, die für Busche einen ganz entscheidenden Wettbewerbsfaktor darstellt. Aus diesem Grunde will man den hohen Qualitätsstandard durch die Einführung des Qualitätssicherungssystems nach DIN/ISO 9000 zementieren.

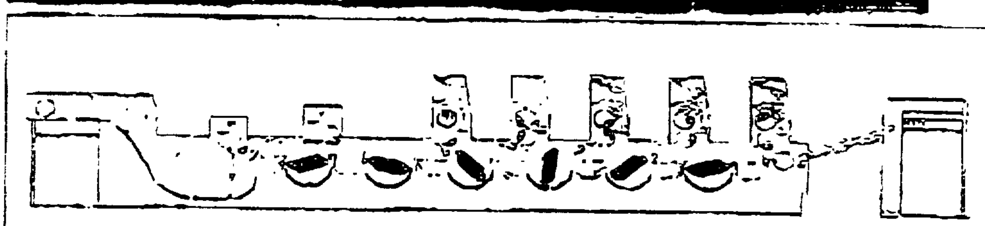
Hervorragende Ergebnisse aus dem Zusammenspiel der Entwicklungspartner

Werner Ringel, Betriebsleiter der Busche Druckereigesellschaft, ging auf einige drucktechnische Aspekte der neuen Goldtechnologie ein. Der Initiator und Erfinder des Verfahrens, Klaus Rietzler, konnte wegen Krankheit an dieser Weltpremiere nicht teilnehmen. So faßte Ringel sich auch kurz und es klang in seinen Ausführungen deutlich durch, welche Anstrengungen, Schulungen und Umdenkungsprozesse notwendig waren, bei Busche nicht nur vom Großformat auf das „handlichere" 3 B-Format umzusteigen, sondern auch vom Offsetdruck auf das direkt arbeitende Flexodruckverfahren. Dabei wurde vor allen Dingen das notwendige Handling der Flexo-Platten (Cyrel/DuPont) erwähnt.

Harald Weberbauer, Abteilungsleiter „Verkauf Offsetfarben" von Michael Huber, besonders aber *Dipl.-Ing. Andrea Heinemann*, zuständig für die Produktentwicklung „Wässrige Systeme" bei Michael Huber und Mit-Erfinderin der europaweit zum Patent angemeldeten „Acrylac"-Gold- bzw. Silberdruckfarben, gingen dann auf die mit Spannung erwarteten weiteren Einzelheiten über das neue Gold ein. Dabei erläuterte Andrea Heinemann zunächst die Nachteile der bekannten Verfahren mit metallisierten Bedruckstoffen, mit der Bronzierung, dem Prägefoliendruck und beim Tiefdruck. Daraus entwickelte sie die Vorteile, die sich bei der Neuentwicklung einer Golddruckfarbe ergeben müßten. Das Ergebnis der Entwicklungsarbeit war ein „Acrylac"-Gold auf wässriger Basis. Man hat sich bei Michael Huber sehr eingehend mit der Herstellungsweise der Metallpigmente, ihrer Teilchengröße und deren Einfluß auf die Deckkraft und Brillanz auseinandergesetzt. Denn alle diesbezüglichen Untersuchungsergebnisse dokumentierte Andrea Heinemann durch übersichtliche und einleuchtende Diagramme. Entscheidend scheint dem Verfasser besonders die Erkenntnis zu sein, daß das wässrige Bindemittel beim neuen „Acrylac"-Gold ein günstigeres Aufschwemmverhalten für die Metallpigmente bietet, als bei den traditionellen Offsetbindemitteln. Daraus resultiert ein planparalleles Aufliegen der Goldplättchen als wichtige Voraussetzung für eine optimale Reflektion des Lichtes. Sie ist die Voraussetzung für Glanz und Brillanz.

Neben dieser Voraussetzung für eine hohe Goldwirkung ist natürlich auch die Auftragsmenge, die auf die Oberfläche des Bedruckstoffes kommt, von Bedeutung. Und hier liegt – nach Verfasser-Meinung – das zweite Geheimnis der neuen Goldtechnik. Es wird nicht indirekt im Offsetdruck über ein Farbwerk gedruckt, sondern über ein spezielles Flexodruckwerk direkt auf den Druckbogen. Es wird also der Hochdruck praktiziert. Aufgrund geringerer Farbspaltung in dem speziellen Lackmodul von MAN Roland kann deutlich mehr Farbe übertragen werden. Dadurch konnten nach Angaben von Andrea Heinemann für das 2-Komponenten „Acrylac"-Gold auch größere Metallpigmente gewählt werden. Die hervorragenden Ergebnisse sind also ein Zusammenspiel von Teilchengröße und -menge, ermöglicht durch die satte Übertragung auf die Hochdruckform und von dort auf kurzem Weg auf die Oberfläche des Bruckstoffes. Versuche zur weiteren Optimierung des Verfahrens an unterschiedliche Anforderungen umfassen auch den Einsatz einer Rasterwalze im Verbund mit einem Kammerrakelsystem, wie es im





Die Fünffarben Roland 700 für die Inline-Veredelung mit Acrylac-Gold bzw. -Silber ist mit zwei Lackmodulen ausgestattet. Im Lackmodul für den Gold- bzw. Silber-Auftrag kommt eine Neuentwicklung von DuPont, die speziell für diese Anwendung entwickelte Cyrel C-M-Photopolymer-Platte, zum Einsatz.

Großes Interesse und rege Diskussion um das „Busche-Gold" auf einer Fünffarben Roland 700 mit zwei Lackmodulen.

Schemazeichnung der Fünffarben Roland 700 mit zwei Lackmodulen bei der Druckerei Fritz Busche in Dortmund.

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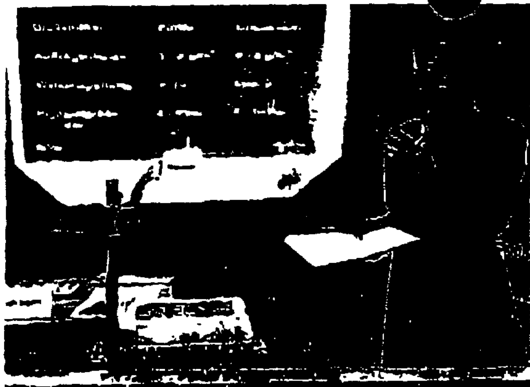


Verarbeitungseigenschaften von Golddruckfarben

Farbe	Pigment	Sensorik	Scheuer-festigkeit	Langzeit-festigkeit
Bronzierung	Cu / Zn	[illegible]	[illegible]	[illegible]
1-K-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]
2-K-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]
Golddruck (Ag)	[illegible]	[illegible]	[illegible]	[illegible]
Optische Gold	Al	[illegible]	[illegible]	[illegible]
Acrylac-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]

Dipl.-Ing. Andrea Heinemann, Michael Huber München, vermittelte als Mit-Erfinderin des „Busche-Gold" technische Details zum Aufbau der neuen Goldfarbe.

Differenziertes Vergleichs-Bild für die Acrylac-Farben bei den Verarbeitungsmerkmalen.

Klaus Rietzler, Leiter der Entwicklungsabteilung „Verfahrenstechnologie" im Hause Busche, erhält von Dipl.-Ing. Martin Lange, Vorstandsmitglied bei MAN Roland, die goldene Verdienstmedaille für seine Pionierarbeit um das „Neue Gold".

Flexodruck bereits vielfach Anwendung findet. Andrea Heinemann faßt die Besonderheiten von „Acrylac"-Gold so zusammen:

- Möglichkeit der Inline-„Bronzierung" in der Offsetmaschine,
- Umweltverträglichkeit, da das Bindemittel auf Wasserbasis aufgebaut ist,
- Geruchsarmut,
- großer Einsatzbereich für Verpackungen und Etiketten,
- Goldeffekte in der Brillanz wie im Tiefdruck.

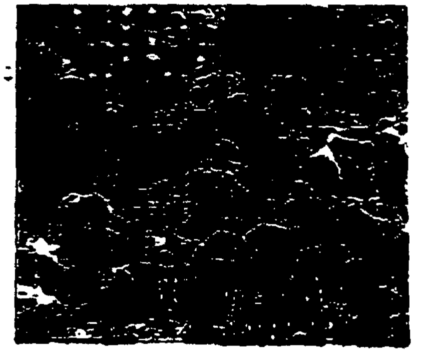
MAN Roland mit hohem Erfahrungspotential bei der Inline-Lackierung

Bevor man zum eigentlichen Höhepunkt der Veranstaltung kam, zur praktischen Vorführung der neuen Goldgeneration auf einer Fünffarben Roland 700, gab *Dipl.-Ing. Martin Lange*, Vorstandsmitglied Vertrieb und Service von MAN Roland, eine Einführung in einige maschinentechnische Details vor allen Dingen, was die Roland 700 anbetrifft. Dabei wurde aber zunächst in Erinnerung gerufen, daß man sich bereits in den 70er Jahren, als man noch Faber & Schleicher hieß, mit der Inline-Lackierung unter Verwendung von wässrigen Dispersionslacken beschäftigt hat und 1979 drei verschiedene Applikationssysteme anbot. Dadurch wurden vor allen Dingen für den Verpackungsdrucker wirtschaftliche und umweltfreundliche Produktionsmöglichkeiten geschaffen.

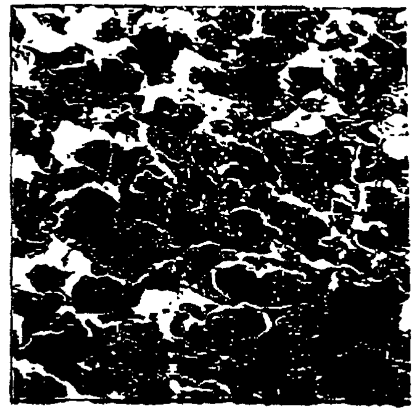
Diese bewährte Inline-Finishing-Konzeption mit Hilfe von Lackiereinrichtung, Lackwerk oder Lackiereinheit bzw. Lackiereinheit mit Widerdruck, ist für die Roland 700 und Roland 200 zur neuen Lackmodultechnik weiterentwickelt worden. Aber es geht heute ja nicht allein nur um die Verbesserung der Druckprodukte durch Lackierung, sondern aus werbepsychologischen Gründen auch um Gold- und Silbereffekte. Hier führte Lange dann die bekannten bisherigen Möglichkeiten der Erzeugung von Goldeffekten auf, bestehend aus der Verwendung von metallisierten Papieren, den Druck von Golddruckfarben (1-K- und 2-K-Farben), die über das Farbwerk aufgedruckt werden, die aufwendige Puderbronzierung, und die Möglichkeit, auf einer separaten Bogen-Tiefdruckmaschine eine gute Golddruckfarbe auf Lösemittelbasis aufzubringen.

An dieser Stelle informierte Lange die internationale Presse darüber, daß MAN Roland für ihre Bogentiefdruckmaschine RK-TD mit der Firma Billhöfer in Nürnberg, als Anbieter von Spezialmaschinen für die Oberflächenveredelung, eine Kooperation für Montage, Vertrieb und Service dieser Maschinen eingegangen ist. Dem neuen „Busche-Gold" stellt der MAN Roland-Manager wirtschaftlich eine traditionelle Puder-Bronzierung gegenüber. Er verdeutlichte das an einer fünffarbigen Arbeit mit einer Druckveredelung durch Golddruckfarbe und anschließender Dispersionslackierung. Dafür wird eine Fünffarben Roland 700 mit zwei Lackmodulen gebraucht. Davon beinhaltet das eine Lackmodul das Flexodruckwerk für die Golddruckfarbe, und das zweite Modul ist das eigentliche Lackmodul für die noch bessere Fixierung der Goldpigmente. Man hat es also mit einer sogenannten Hybrid-Maschine zu tun, da sie zwei Druckverfahren praktiziert: den Offsetdruck für die Farben und den Hochdruck (Flexodruck) für den Golddruck.

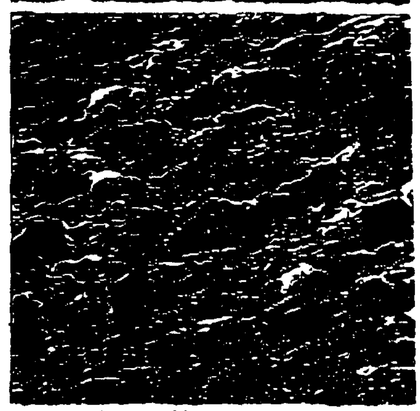
Der Vergleich mit einer aufwendigen Bronzierung ist deshalb statthaft, weil das neue „Busche-Gold" qualitativ fast an eine Puderbronzierung heranreicht.



Struktur einer traditionellen Golddruckfarbe. Die Reflektion und damit Brillanz ist beeinträchtigt durch nur kleine Metallpigmente, die auch noch in Bindemittel eingebettet sind.



Struktur einer Bronzierung. Die nach wie vor beste Goldwirkung ist zu erklären durch die relativ großen und flach aufliegenden Metallpigmente. Sie lassen eine gute Reflektion des einfallenden Lichtes zu.



Struktur des „Busche-Gold". Auch hier sind deutlich die relativ großen und flach aufliegenden Metallpigmente zu sehen, die eine Goldwirkung ermöglichen, fast wie bei einer Bronzierung.

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Aber die „alte" Bronziermethode ist wesentlich aufwendiger, denn wenn es um eine 5-farbige Arbeit mit Gold geht, braucht man neben einer Fünffarbenmaschine eine Bronziermaschine, einschließlich der Offsetmaschine für die Übertragung der Gold-Unterdruckfarbe, und schließlich dann auch noch einen weiteren separaten Durchgang für einen Lacküberdruck. Im übrigen, so Lange weiter, sei die Produktionsgeschwindigkeit beim Bronzieren im Verhältnis zur Inline-Fertigung nach dem Busche-Konzept sehr langsam. Dies würde die Durchlaufzeit eines Auftrags verlängern und die Personalkosten erhöhen. Dabei besteht im Rahmen der EG-Richtlinien mehr und mehr die Forderung nach schwermetallarmen Metalleffekten, und damit seien Gold- und Silberlacke auf wässriger Basis, wie sie beim „Busche-Gold" eingesetzt werden, ökologisch günstiger.

Neue Impulse für den Offset

Die praktische Vorführung der goldenen Busche-Konzeption war beeindruckend und absolut überzeugend. Der Verfasser weiß, worüber er berichtet: denn er hat in der vergangenen Zeit selber bronziert und die Probleme praktisch kennengelernt. Dabei hat er dann auch in vielen Auflagen den qualitativen Niedergang mit den Golddruckfarben, die über das Farbwerk gedruckt wurden, mitgemacht. Sie glänzten zu wenig, sie neigten in Verbindung mit der notwendigen Wasserführung zum Emulgieren, und auch die Trocknung ließ nicht selten manche Wünsche offen. Busche demonstrierte mit der Roland 705 nicht nur die Offsettechnologie der Zukunft, sondern – in Verbindung mit dem Flexo- und Lackmodul von MAN Roland – die „goldene Zukunft". Kein Stäuben von Bronzepulvern, kein Emulgieren oder Aufbauen, sondern eine hervorragende Goldwirkung mit Tiefdruckqualität in Verbindung mit sehr guter Haftung auf der Oberfläche des verwendeten Kartons, da ja nach ganz kurzer Zwischentrocknung auch noch ein Schlußlack auf wässriger Basis aufgedruckt wird.

Sicherlich werden in der Abstimmung zwischen Offsetdruck und Flexodruck, d.h. Abwicklung Offsetplatten und Flexodruckplatten (Cyrel), vielleicht in diesem oder jenem Fall noch Probleme zu lösen sein. Aber das ändert für den Verfasser als „gestandenen" Offsetfachmann nichts an dem Tatbestand, daß wieder Fachleute aus der Praxis dem Offsetdruck neue, starke Impulse gegeben haben, die sich vor allen Dingen für Busche auszahlen werden. Man ist dort tatsächlich eine goldene Nasenlänge voraus.

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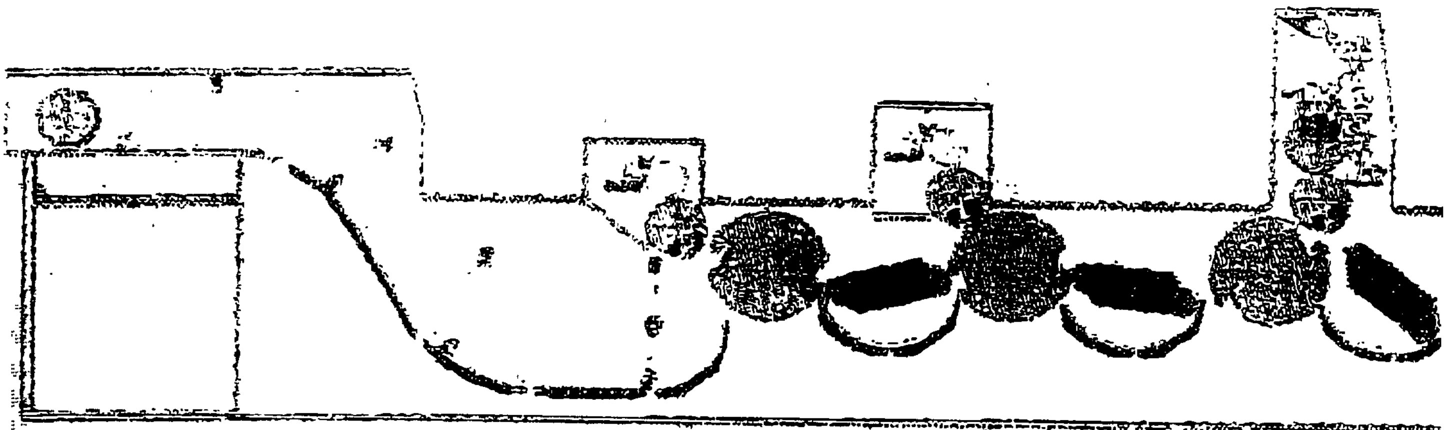

Die Fünffarben Roland 700 für die Inline-Veredelung mit Acrylac-Gold bzw. -Silber ist mit zwei Lackmodulen ausgestattet. Im Lackmodul für den Gold- bzw. Silber-Auftrag kommt eine Neuentwicklung von DuPont, die speziell für diese Anwendung entwickelte Cyrel C-M-Photopolymer-Platte, zum Einsatz.

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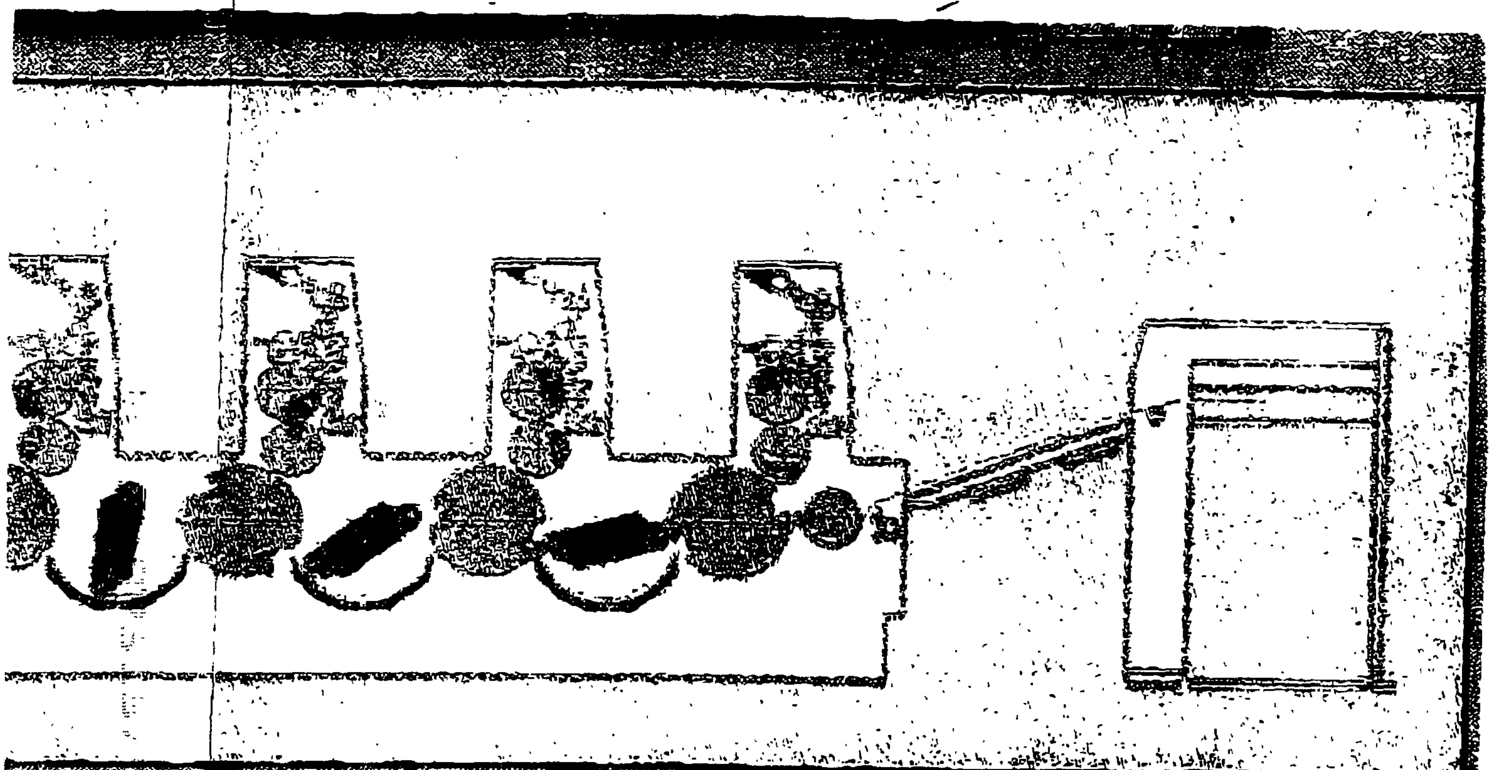

ßes Interesse und rege Diskussion um das
ische Gold" auf einer Fünffarben-Roland 700
zwei Lackmodulen

emazeichnung der Fünffarben-Roland 700
zwei Lackmodulen bei der Druckerei Fritz
che in Dortmund.

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

K1 = Offsetpraxis 3/1993 pages 12-15
K1A = enlarged detail of page 13 of K1

Ch. König

(Christian König)

Sheet-fed Offset
process technology

"Gold mine"

Busche presents innovation for offset printing in Dortmund.

At the end of January, nearly at the same point in time in the Druckerei Busche in Dortmund and at the Stuttgarter Druckforum, a new gold printing process was presented. It is based on the use of offset gold printing ink based on aqueous fixing agents and was developed in a cooperation by the Busche group of companies, the Farbenfabrik Michael Huber München, DuPont de Nemours (Germany) GmbH, and MAN Roland Druckmaschinen AG in Offenbach. Wolfgang Walenski, engineer, observed the Dortmund premiere for the OffsetPraxis readers.

For the end of January, the Druckereigesellschaft Busche in Dortmund invited to a press conference with the rather plain title "Dialog in Gold". But the dialogue was anything but plain. It revealed an innovation that will not only give fresh impulses to the offset printing world and secure its market share, but will increase this share in the future. The "Dialog in Gold" deals with a technology, which allows one to implement economical, high quality gold printing with a brilliance never before achieved using this technique, right after the multi-color offset printing, inline in the same processing step. Busche presented the "new gold" as a joint development of the firm Busche together with MAN Roland and the Druckfarbenfabrik Michael Huber.

/Image/

Hereby, the core of the "innovation through partnership" is the filed process patent by Klaus Rietzler, the head of the development division "Process technology" at the firm Busche, and Andrea Heinemann of the division "Product development" at Michael Huber München.
Before the author draws the attention of the experts to the technical aspects of the new golden era in offset printing, we shall deal with the introductory seminars, which preceded the Dortmund practical demonstration on a Fünffarben Roland 700.
Dr. Andreas Altmeyer, spokesperson of the management of Busche Unternehmensgruppe, made it clear in his statements that the printing trade is characterized by a rapid development of technology and the possibilities it presents, and that in changing markets one is forced to think and act in innovative ways, in combination with paying attention to environmental issues. Based on this background, Busche decided a long time ago not only to have an offensive concept in environmental issues, but to make use of the outstanding knowledge of its employees to invest in new technologies, machines, and plants. This led to the cooperation with MAN Roland and Michael Huber for the development of a novel gold printing process for sheet-fed offset printing that is unique in the world. To emphasize the value of a product, gold- and silver effects of high gloss and brilliance on the packaging are still very important. Up to now, high-quality metallic effects could only be created using intaglio printing with solvent-containing inks, using the expensive hot-foil relief printing, or using the expensive bronzing in a separate processing step. Dr. Altmeyer declared Klaus Rietzler, head of the development division "Process technology", the father of a technology developed in the firm Busche to apply gold printing ink onto the print sheet, which almost reaches the quality of traditional classic bronzing. But this does not take place in a separate printing step, but is achieved in an inline-production in combination with the color printing. Extremely helpful assistance in the multi-year development work was obtained from the Druckfarbenfabrik Michael Huber where one based gold printing ink on an aqueous fixing agent system, and from MAN Roland where one developed a special coating module for the new gold technology and presented it as a world novelty in the firm Busche, in combination with a Roland 705.
Dr. Altmeyer used the world premiere of the new gold generation, to also briefly illustrate other environmental activities as integral parts of the company's philosophy. The company also wants to indicate a direction and point the way for other companies. He mentioned the modern thermal post-combustion unit for reel-fed offset printing, and the part played in the creation of a guideline for a commercial waste management concept and waste material accounting by the Swiss Prognos Institute, in a contract from the ministry for environment, regional planning, and agriculture of North Rhine-Westphalia. This guideline has now been circulated by the ministry. As companion material, Busche has developed a special computer program, which can be obtained in combination with a manual on computer disk for a minimal fee from the Busche Verlagsgesellschaft.

Of course, quality, which Bushe believes to be a deciding competitive factor, is still of high priority. For this reason, one wants to maintain the high quality standards by introducing a quality protection system according to DIN/ISO 9000.

Excellent results out of the cooperation of the partners in development.

Werner Ringel, manager of operations of Busche Druckereigesellschaft, today addressed some printing related aspects of the new gold technology. Klaus Rietzler, the initiator and inventor of the process, was not able to attend this world premiere due to illness Consequently, Ringel spoke only briefly, and it could be heard clearly in his statements how significant the efforts, the training, and the re-thinking had been, which were necessary to have Busche change not only from the large format to the more "handy" 3B-format, but also from offset printing to the more direct flexo printing method. Mentioned herein was especially the necessary handling of the flexo plates (Cyrel/DuPont). Subsequently, Harald Weberbauer, head of the division of "Sales offset inks" at Michael Huber, and especially Andrea Heinemann, Cert. Eng., responsible for the product development "Aqueous systems" at Michael Huber and co-inventor of the "Acrylac" gold and silver printing inks, for which a Europe-wide patent has been applied for, talked about the much-anticipated further details about the new gold. Hereby Andrea Heinemann at first illustrated the disadvantages of the known processes that employ metallized materials to be printed, bronzing, embossing foil printing, and intaglio printing. Out of this she developed the advantages that the new development of a gold printing ink would have to possess. The result of the development process was an "Acrylac"-gold on an aqueous basis. Work at Michael Huber dealt intensively with the manufacturing process of metal pigments, their particle sizes, and their effect on covering capacity and brilliance. Andrea Heinemann documented all experimental results relating to this with well-ordered and illuminating diagrams. It seems especially significant to the author that the aqueous fixing agent of the new "Acrylac" gold offers more favorable suspension properties for the metal pigments than traditional offset fixing agents.

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The Fünffarben Roland 700 for the inline-converting with Acrylac gold or silver is equipped with two coating modules. The coating module for the application of gold or silver employs a new development by DuPont, the Cyrel C-M photo polymer plate, which has been developed especially for this application.

Much interest and animated discussions surrounding the "Busche gold" on a Fünffarben Roland 700 with two coating modules.

Schematic diagram of the Fünffarben Roland 700 with two coating modules at the Druckerei Fritz Busche in Dortmund.

This results in a more planar contact of the gold platelets as an important condition for an optimized light reflection. This is a precondition for gloss and brilliance.

Not only do these conditions have to be met for a good gold effect, the quantities applied to the materials to be printed is of course also of importance. And herein lies – in the author's opinion – the second secret of the new gold technique Printing does not take place indirectly in offset printing by means of an inking unit, but directly onto the sheet by means of a special flexo printing unit. I.e. this is a relief printing process. Due to little ink separation in the special coating module by MAN Roland, significantly more ink can be applied.

Due to this, according to statements made by Andrea Heinemann, larger metal pigments could be used for the 2-component "Acrylac" gold. Thus, the outstanding results are due to a combination of particle size and particle quantity, made possible by a saturated transfer to the relief form, and from there via a direct route to the surface of the material to be printed. Trials to further optimize the process for different requirements include the use of an anilox roller in combination with a doctor blade chamber, as is already common usage in flexo printing.

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Cert. Eng. Andrea Heinemann, of Michael Huber München, the co-inventor of the "Busche gold", revealed technical details of the structure of the new gold ink.

Differentiated comparison chart for Acrylac inks for the shown processing characteristics.

Klaus Rietzler, Head of the development division "Process technology" in the firm Busche, receives the golden medal of merit for his pioneering work for the "New gold" from Cert. Eng. Martin Lange, member of the board of MAN Roland.

Andrea Heinemann summarizes the special characteristics of "Acrylac" gold :

- The option of inline-"bronzing" in an offset machine.
- Environmentally friendly, since the fixing agent is water based.
- Reduced odor development
- Large application potential for packaging and labels.
- Gold effects of the same brilliance as known in intaglio printing.

MAN Roland has vast experience in inline-coating

Even before the actual climax of the event arrived, a practical demonstration of the new generation of golds on a Fünffarben Roland 700, Cert. Eng. Martin Lange, member of the board responsible for distribution and service at MAN Roland, presented an introduction to some of the engineering details, in particular relating to the Roland 700. At first one was reminded how in the 70s, when the company name was still Faber&Schleicher, the company was involved in inline coating using water based dispersion coatings, and in 1979 offered three different applicator systems. In particular for printers of packaging, this offered economical and environmentally friendly production options

This proven inline finishing concept by means of coating device, or coating unit, or coating unit with counter pressure, has been further developed in the Roland 700 and Roland 200 as the new coating module technology. But what is important today is not only the improvement of printed products by coating, but also, for psychological advertising reasons, gold and silver effects. At this point Lange listed the so far known options for generating gold effects, in particular the use of metallized papers, the printing of gold printing inks (1K and 2K inks) by the inking unit, the expensive powder bronzing, and the possibility to apply a high-quality gold printing ink on solvent basis using a separate sheet-fed intaglio printing press.

At this point, Lange informed the international press that MAN Roland has entered into a cooperation for assembly, distribution, and service for the sheet-fed intaglio printing press RK-TD with the firm Billhofer in Nürnberg, a provider of specialized machinery for surface converting.

The economical answer of the MAN Roland manager to the new "Busche Gold" was a traditional powder bronzing. He provided more detail using a five-color project with a print conversion by gold printing ink, and a subsequent dispersion coating. For this a Fünffarben Roland 700 with two coating modules is needed. One of the coating modules contains the flexo printing unit for gold printing ink, and the second module is the actual coating module to achieve an improved fixing of the gold pigments.

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Structure of a traditional gold printing ink. The reflectivity, and thus the brilliance, is negatively affected by comparatively small metal pigments, which are also surrounded by fixing agents.

Structure of a bronzing. Still the best achievable gold effect, which can be explained by the planar contact of the relatively large metal pigments. They allow excellent reflection of the incident light.

Structure of "Busche Gold". Here as well, one can see the planar contact of relatively large metal pigments, which make a gold effect possible, almost as in bronzing.

Thus one is dealing with a so-called hybrid machine executing two printing processes: offset printing for colors and relief printing (flexo printing) for gold printing

A favorable comparison to expensive bronzing can be made since the new "Busche Gold" almost reaches the quality of a powder bronzing.

But the 'old' bronzing method is significantly more expensive, since for a 5-color process with gold one requires, in addition to a Fünffarben (Five color (The Translator)) machine, a bronzing machine, including an offset machine for the transfer of the golden base print ink, and finally also a further separate pass for applying a top coat of lacquer. Lange: In addition, the production speed in bronzing is very slow compared to that of the inline production of the Busche concept. This would increase a project's cycle time and would increase personnel costs. The framework of the EC guidelines more and more calls for metal effects with fewer heavy metals, and thus gold and silver coatings on an aqueous basis, as used in "Busche Gold", are preferable for environmental reasons.

/Image/

New impulses for offset

The practical demonstration of the golden Busche invention was impressive and absolutely convincing. The author knows what he is reporting about: He himself has in past times used bronzing and got to know the practical problems. Hereby he also witnessed in many printing runs the qualitative descent of the gold printing inks being printed by the inking unit. They did not appear glossy enough, in combination with the required water flow they tended to emulsify, and also the drying left much to be desired. With the Roland 705, Busche not only demonstrated the offset technology of the future, but – in combination with the flexo and coating module by MAN Roland – the "golden future". No dust of bronzing powders, no emulsifying or build-up, but outstanding gold effects in intaglio printing quality in combination with excellent adhesion to the surface of the used cardboard, since, after a very short intermediate drying step, a final coating on aqueous basis is applied.
In the fine-tuning of the combination of offset printing and flexo printing, i e. development offset plates and flexo printing plates (Cyrel), there will most certainly be problems to solve, here and there. But for the author, a "tried and tested" offset expert, this does not change the fact that again practical experts have given fresh, strong impulses to offset printing, which will pay off especially for Busche. They are ahead by a golden length of the nose, indeed.

Following document: 'K1A' , enlarged detail of page 13 of K1

/Diagram/

The Fünffarben Roland 700 for the inline-conversion using Acrylac-Gold or Acrylac–Silver is equipped with two coating modules. The coating module for the gold or silver application employs a new development by DuPont, the Cyrel C-M photo polymer plate, which was developed especially for this application.

Much interest and animated discussions surrounding the "Busche gold" on a Fünffarben Roland 700 with two coating modules.

Schematic diagram of the Fünffarben Roland 700 with two coating modules at the Druckerei Fritz Busche in Dortmund.

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<u>K2</u>

US005176077A

United States Patent [19]

DeMoore et al.

[11] Patent Number: 5,176,077

[45] Date of Patent: Jan. 5, 1993

[54] COATING APPARATUS FOR SHEET-FED, OFFSET ROTARY PRINTING PRESSES

[75] Inventors: Howard W. DeMoore, 2552 Royal La., Dallas, Tex. 75229; David D. Douglas, Garland; Steven M. Person, Seagoville, both of Tex.

[73] Assignee: Howard W. DeMoore, Dallas, Tex.

[21] Appl. No.: 752,778

[22] Filed: Aug. 30, 1991

[51] Int. Cl.[5] B41F 9/00

[52] U.S. Cl. 101/142; 101/147; 101/232; 101/348; 118/46

[58] Field of Search .... 101/135, 424.1, 142, 101/148, 155, 157, 177, 217, 232, 246, 329, 330, 331, 408, 409, 419, 422, 348-349; 118/46, 211, 236, 249, 257, 258, 261, 262, 263, 206, DIG. 15

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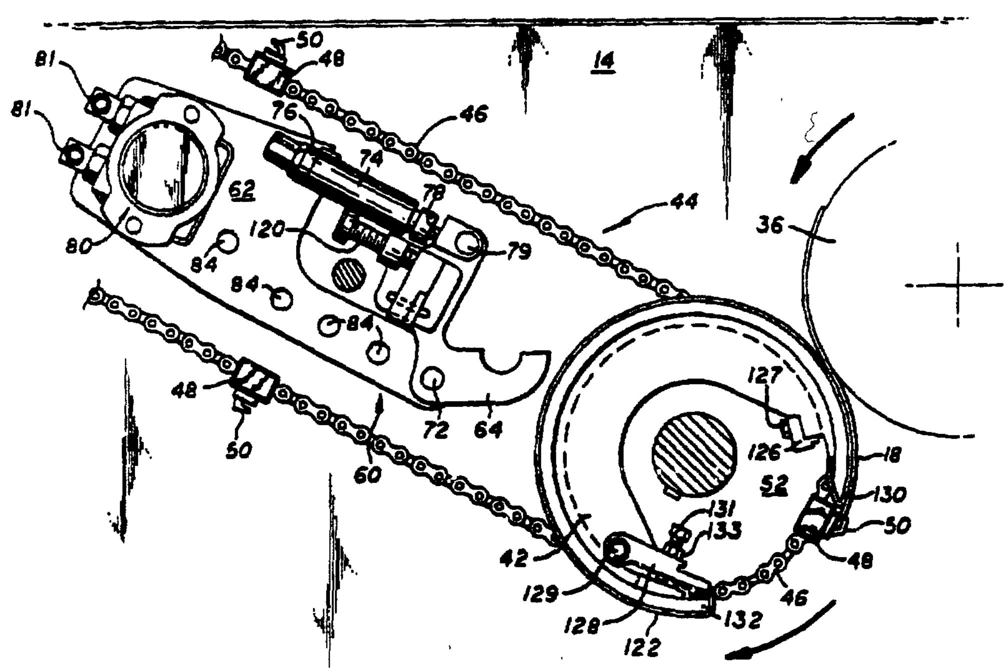
Primary Examiner—Eugene H. Eickholt
Attorney, Agent, or Firm—Dennis T. Griggs

[57] ABSTRACT

A coating apparatus for use in a sheet-fed, offset rotary printing press to selectively apply a protective and/or decorative coating to the wet ink surface of freshly printed sheets and including a coating unit having a pick-up roller for supplying aqueous coating material from a reservoir to the surface of a delivery cylinder mounted on a press delivery drive shaft, the delivery cylinder performing the dual function of a coating applicator roller and a delivery cylinder during coating operations.

22 Claims, 5 Drawing Sheets



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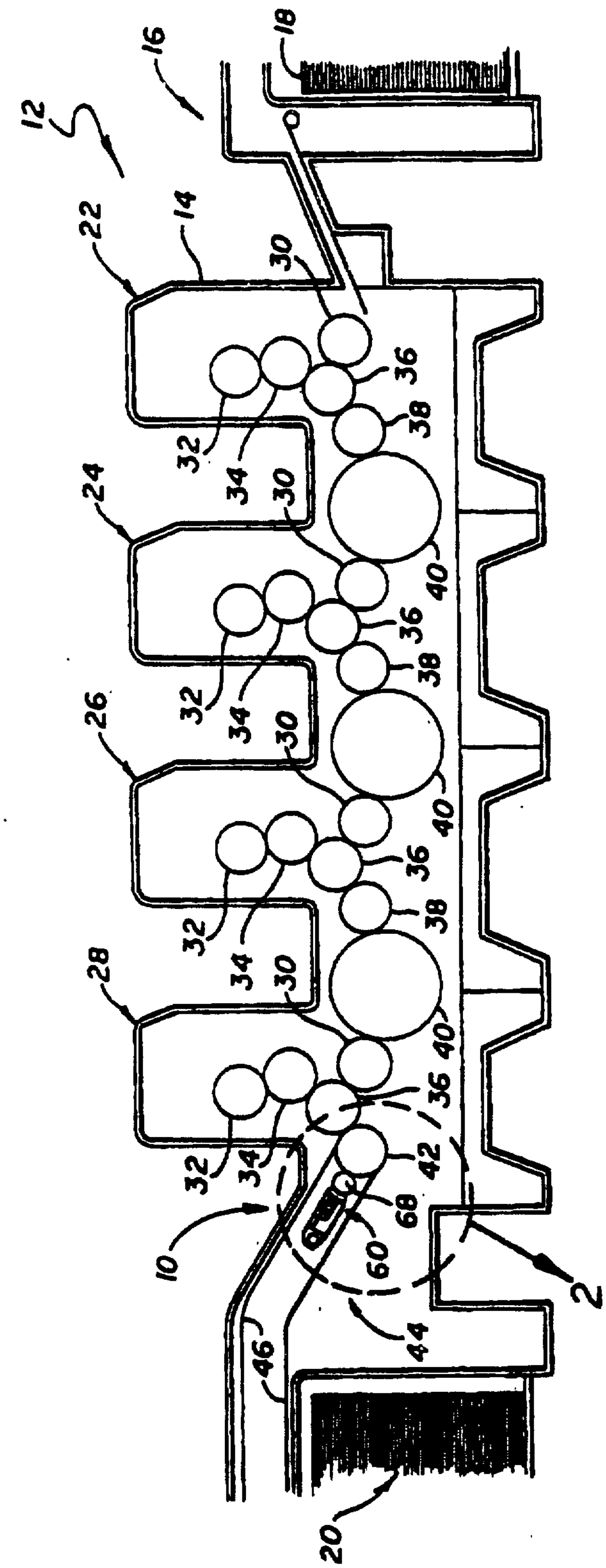

FIG. 1

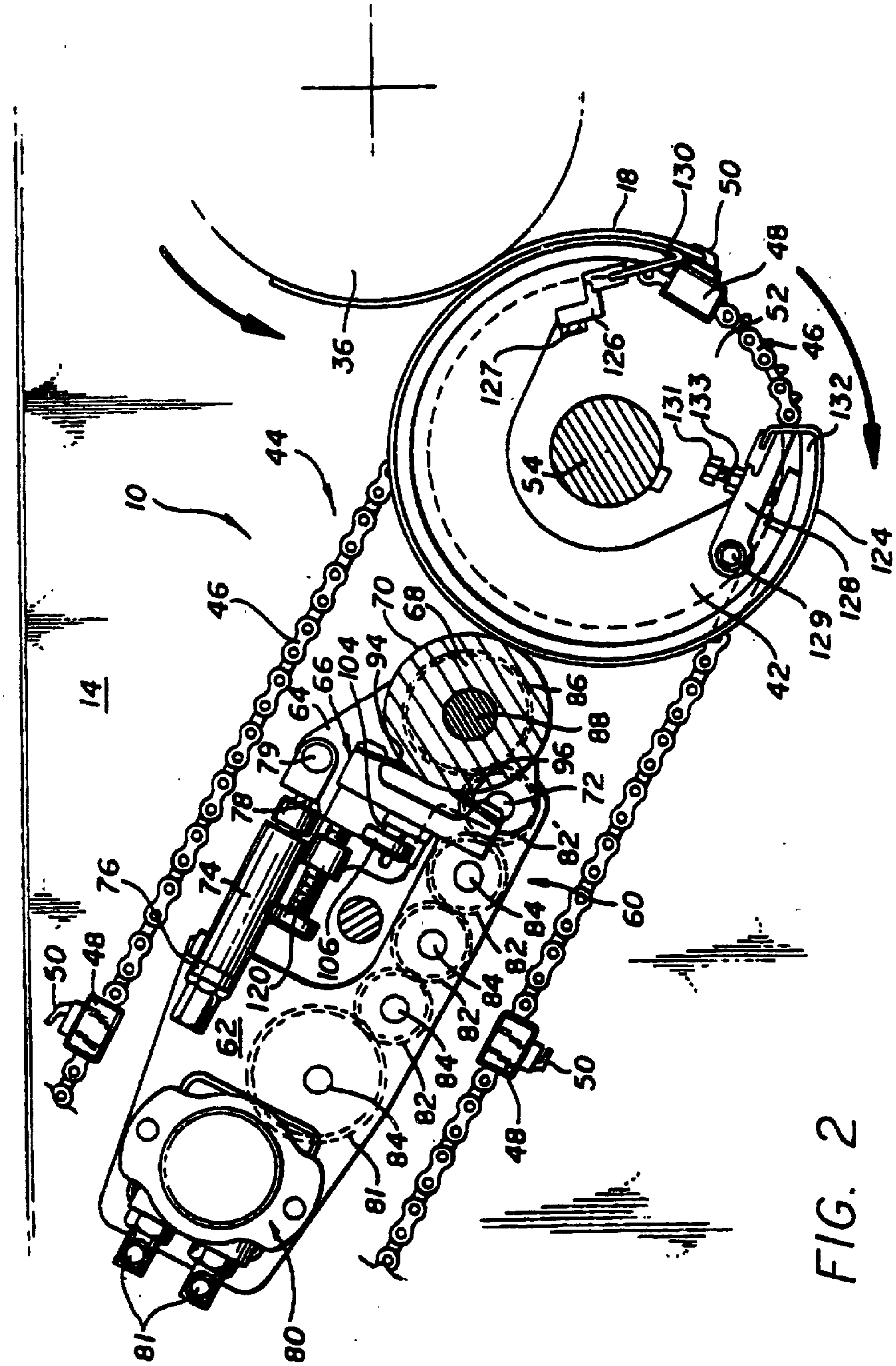

FIG. 2

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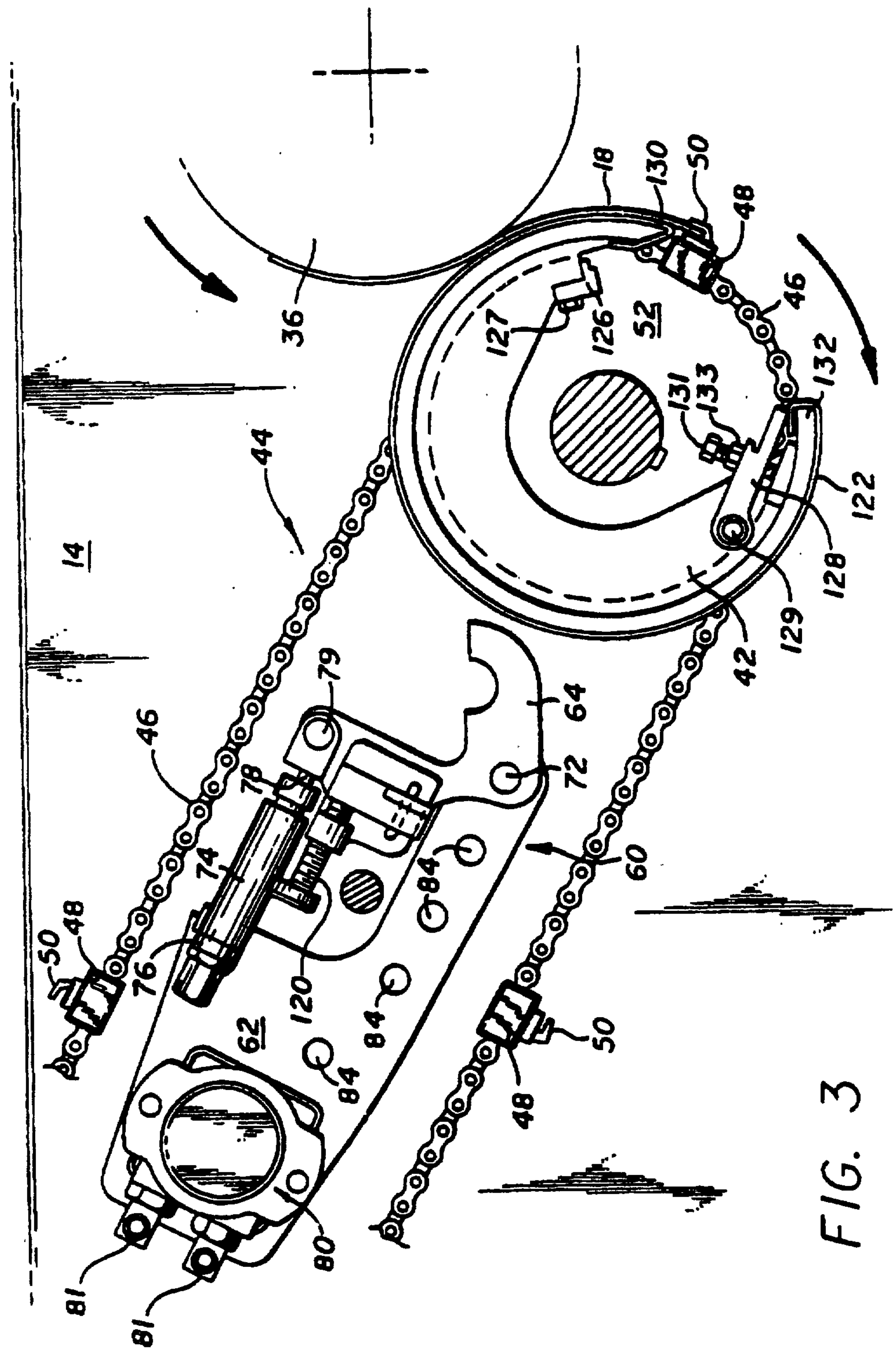
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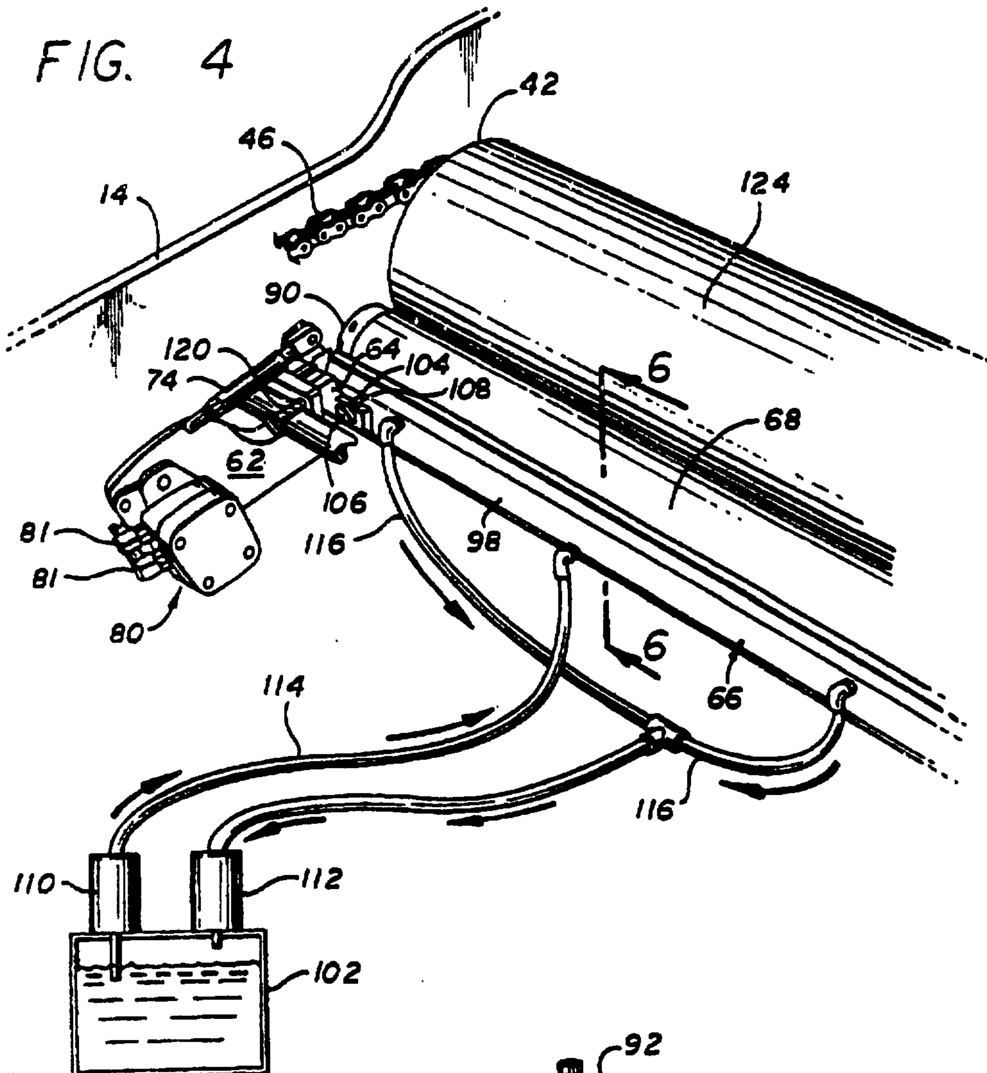
FIG. 3

FIG. 4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90
120
64
104
74
108
6
68
62
106
81
81
116
98
80
6
66
114
116
110
112
102

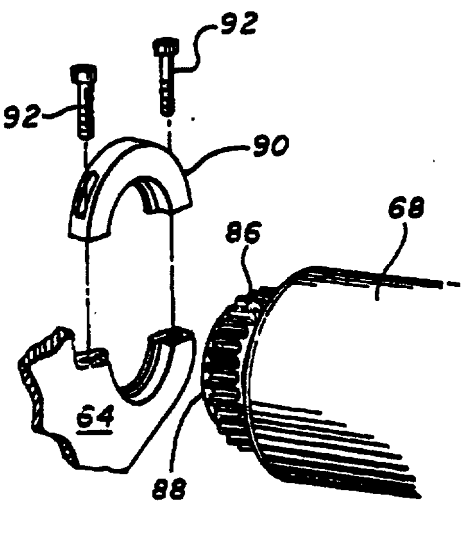
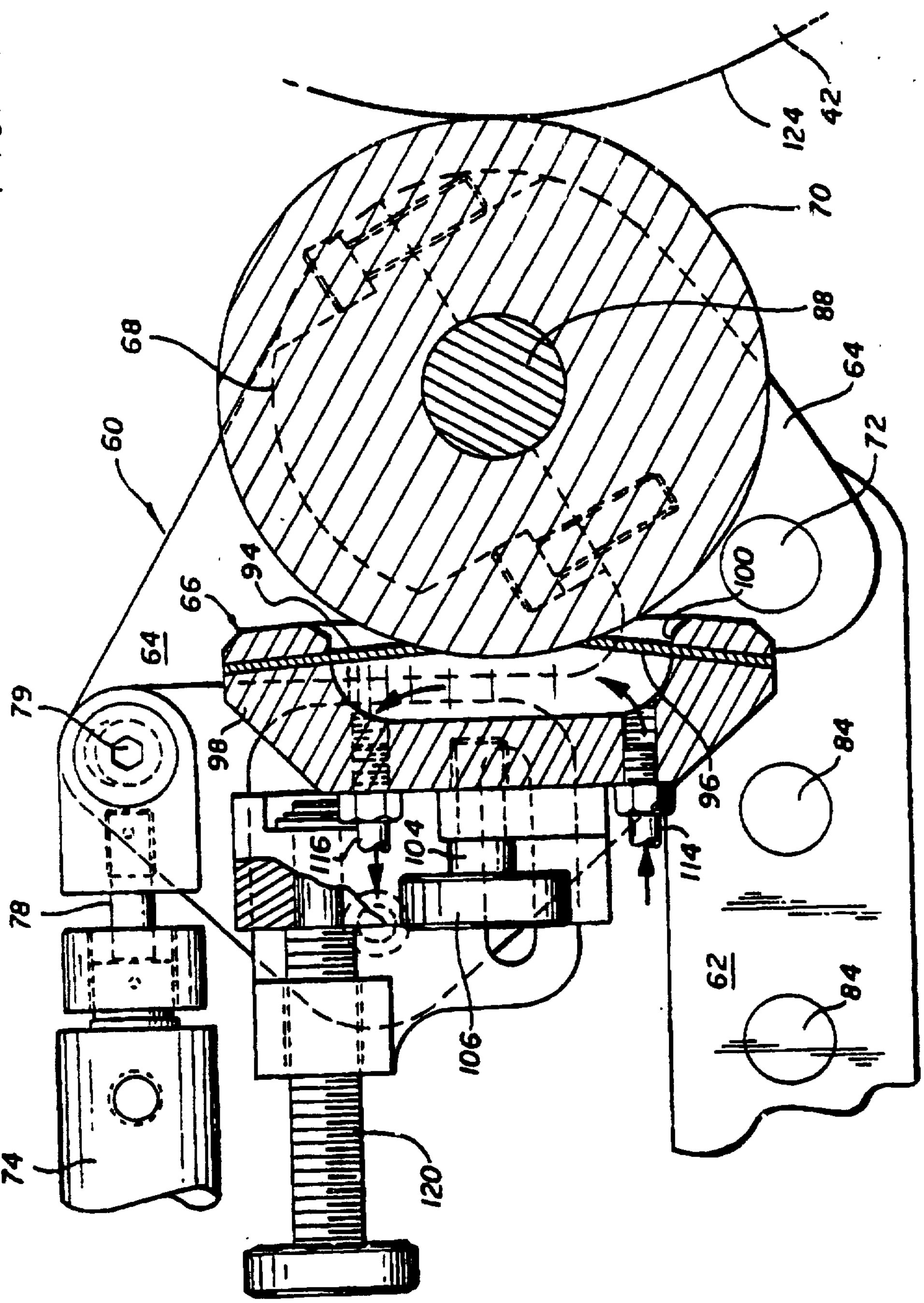

92
92
90
68
86
64
88

FIG. 5

FIG. 6


124
42
70
88
64
72
68
60
100
94
66
64
79
98
96
84
116
104
114
78
62
84
106
74
120

COATING APPARATUS FOR SHEET-FED, OFFSET ROTARY PRINTING PRESSES

BACKGROUND OF THE INVENTION

This invention relates to sheet-fed, offset rotary printing presses, and more particularly, to a new and improved apparatus for the in-line application of protective and decorative coatings to the printed surface of freshly printed sheets.

Conventional sheet-fed, offset rotary printing presses typically include one or more printing stations through which individual sheets are fed and printed with wet ink. After final printing, the sheets are fed by a delivery conveyor system to the delivery end of the press where the freshly printed sheets are collected and stacked. In a typical sheet-fed, offset rotary printing press such as the Heidelberg Speedmaster line of presses, the delivery conveyor system includes a pair of endless gripper chains carrying laterally spaced gripper bars and grippers which are used to grip and pull freshly printed sheets from the impression cylinder and convey the sheets toward the sheet delivery stacker. The gripper chains are driven in precisely timed relation to the impression cylinder by gripper chain sprocket wheels laterally spaced between a delivery drive shaft mounted on opposite sides of the press frame, the delivery drive shaft being mechanically coupled by gears for synchronous rotation with the impression cylinder.

Since the inks used with offset type printing presses typically remain wet and tacky for some time after printing, special precautions must be taken to insure that the wet inked surface of the freshly printed sheets are not marked or smeared as the sheets are transferred from one printing station to another, and through the delivery system to the sheet delivery stacker. One system for insuring that the freshly printed sheets are not marked or smeared during transfer is the transfer or delivery cylinder system marketed by Printing Research, Inc., of Dallas, Texas under its registered trademark "SUPER BLUE" That system, which is made and sold under license, is made in accordance with and operates as described in U.S. Pat. No. 4,402,267, issued Sep. 6, 1983 to Howard W. DeMoore, the disclosure of which is incorporated herein by this reference. In that system, marking and marring of freshly printed sheets is prevented by employing transfer or delivery cylinders provided with a coating of friction reducing material such as PTFE (Teflon) over which are loosely mounted fabric covers, referred to in the trade as "nets", and which support the wet ink side of the freshly printed sheets as they are pulled from the impression cylinder. Typically, in a multi-color press employing the "SUPER BLUE" cylinder system, each transfer cylinder for conveying the freshly printed sheets from one printing station to the next is supplied with a "SUPER BLUE" transfer cylinder system, and the delivery cylinder for conveying the sheets from the last printing station to the sheet delivery stacker is supplied with a "SUPER BLUE" delivery cylinder system. As used hereinafter, the term "net type cylinder" is intended to refer to cylinders having fabric nets disposed over the support surface, such as of the general type disclosed in the aforementioned DeMoore U.S. Pat. No. 4,402,267 and exemplified by the "SUPER BLUE" cylinder system.

Another system which can be used to prevent marking and smearing of the freshly printed sheets is that disclosed in U.S. application Ser. No. 07/630,308 filed Dec. 18, 1990 entitled Vacuum Transfer Apparatus for Sheet-Fed Printing Presses now U.S. Pat. No. 5,127,329. That application, the disclosure of which is also incorporated herein by reference, discloses an apparatus which can be employed to draw the unprinted side of a freshly printed sheet into engagement with rollers which support the sheet on the unprinted side during transfer or delivery of the sheet from the impression cylinder after printing so that the wet ink on the freshly printed sheet does not come in contact with other apparatus in the press. The vacuum transfer apparatus disclosed in that application can be used as an alternative to the net type cylinder system disclosed in the aforementioned DeMoore patent, or when used in a perfecting press, as a supplement to that system, the vacuum transfer apparatus being primarily intended for use when only one-sided sheet printing is being performed by the press, and the net type cylinder system being used when the press is operating in the perfector mode with two-sided sheet printing.

In some printing applications, it is desirable that the press be capable of applying a protective and/or decorative coating over all or a portion of the surface of the printed sheets. Such coatings typically are formed of a UV-curable or water-soluble resin applied as a liquid solution or emulsion by an applicator roller over the freshly printed sheets to protect the ink and improve the appearance of the sheets. Use of such coatings is particularly desirable when decorative or protective finishes are required such as in the production of posters, record jackets, brochures, magazines, folding cartons and the like. In cases where a coating is to be applied, the coating operation is carried out after the final ink printing has been performed, most desirably by an in-line coating application, rather than as a separate step after the printed sheets have been delivered to the sheet delivery stacker.

Various suggestions have been made for applying the coating as an in-line press operation by using the final printing station of the press as the coating application station. For example, in U.S. Pat. Nos. 4,270,483, 4,685,414, and 4,779,557 there are disclosed coating apparatus which can be moved into position to allow the blanket cylinder of the last printing station of a press to be used to apply a coating material to the sheets. In U.S. Pat. No. 4,796,556 there is disclosed a coating apparatus which can be selectively moved between the blanket cylinder or the plate cylinder of the last printing station of the press so that that station can be used as a coating station for the press. However, when coating apparatus of these types are used, the last printing station can not be used to apply ink to the sheets, but rather can only be used for the coating operation. Thus, with these types of in-line press coating apparatus, the press loses the capability of printing its full range of colors since the last printing station is converted to a coating station.

Suggestions for overcoming the problem of the loss of a printing station when coating is desired have also been made, such as that set forth in U.S. Pat. Nos 4,934,305 which discloses a coating apparatus having a separate timed applicator roller positioned to apply the coating material to the printed sheet while the sheet is on the last impression cylinder of the press. This is said to allow the last printing station to be operated simultaneously as both an ink application station and a coating

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station so that no loss of press printing unit capability results. Another approach to providing a coating station without loosing the printing capabilities of the last printing station is to provide a totally separate coating unit down stream of the last printing station so that the coating is applied to the sheets after final printing and before the sheets have reached the sheet delivery stacker. Such an approach is suggested in U.S. Pat. Nos. 4,399,767 and 4,706,601. While each of these suggestions provide coating stations which allow the final printing station to continue to be used for printing, they each suffer from the disadvantages of requiring the provision of separately driven coating applicator rollers and apparatus which must be precisely timed in relation to the movement of the sheet to be coated so as to insure precise registration between application of the coating material and the printed sheet. The provision of separate timed applicator rollers require that the presses be modified to provide sufficient space within the presses to accommodate the added coating apparatus or to increase the length of the presses, and require additional and complex drive connections with the press drive system to achieve the required precise speed correlation between the sheets and the applicator rollers. Such modifications can be both expensive and cumbersome to install and maintain.

Thus, there exists a need for a new and improved in-line apparatus for use in a sheet-fed, offset rotary printing press to selectively apply a protective and/or decorative coating to the printed surface of freshly printed sheets which allows the final press printing station to continue to be used as a printing station, yet which does not require any substantial press modification or the addition of a separate timed applicator roller. As will be explained in more detail hereinafter, the present invention solves this need in an novel and unobvious manner.

SUMMARY OF THE INVENTION

The present invention provides a new and improved in-line apparatus for selectively applying a protective and/or decorative coating to the surface of freshly printed sheets in a sheet-fed, offset rotary printing press which is highly reliable and effective in use, yet which does not require any expensive or substantial press modification or result in any impairment of normal press operating capability. The present invention enables the press to be used to selectively apply the coating material to the freshly printed sheets as the sheets are conveyed from the impression cylinder of the last printing station of the press toward the sheet delivery stacker by utilizing a delivery cylinder mounted to the existing press delivery drive shaft to perform the dual function of a coating material applicator roller and a sheet delivery cylinder so that no modification of the press is required to enable the press to be used for either coating or noncoating operation, and without impairment of any normal press operations.

More specifically, the present invention is intended for use in a sheet-fed, offset rotary printing press of the type having at least one printing station which includes a blanket cylinder and an impression cylinder disposed for printing ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets off the impression cylinder and transporting the sheets toward the press sheet delivery stacker. For use of the present invention, the press must include a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder, and which is driven in timed synchronous relation with the impression cylinder.

In accordance with the invention, a delivery cylinder is mounted to the delivery drive shaft and provided with a coating blanket disposed over the peripheral outer surface of the cylinder, and adapted to engage and support the wet ink side of a freshly printed sheet. A coating apparatus including a supply of liquid coating material and a pick-up roller disposed to receive coating material from the supply, is mounted to the press and operable to permit the pick-up roller to be moved into engagement with the delivery cylinder so that coating material on the pick-up roller is transferred to the coating blanket of the delivery cylinder and then to the freshly printed sheet.

Preferably, the coating apparatus is mounted to the press downstream of the delivery drive shaft, and includes means to selectively move the pick-up roller into and out of engagement with the delivery cylinder. When the pick-up roller is not in the operable position in engagement with the delivery cylinder, the delivery cylinder can be used for conventional noncoating sheet delivery by removing the coating blanket and, preferably, replacing the coating blanket with a fabric net such as of the net type cylinder system previously described. To convert to a coating operation, the coating blanket is attached to the delivery cylinder and, depending upon the thickness of the sheets to be printed, packed with suitable packing sheets to increase the effective diameter of the cylinder so that pressure is applied to the freshly printed sheets against the impression cylinder by the coating blanket covered delivery cylinder. The pick-up roller is then moved to the operative position engaged with the delivery cylinder so that as freshly printed sheets are pulled by the delivery conveyor from the impression cylinder around the delivery cylinder, coating material applied to the delivery cylinder by the pick-up roller is transferred to the freshly printed sheets in the nip between the delivery cylinder and the impression cylinder.

Since the delivery cylinder is driven by the delivery drive shaft in precise timed relation with the impression cylinder, exact registration between the application of coating material and the printed sheet is assured. Further, since the coating of the freshly printed sheets is carried out through use of a delivery cylinder mounted to the existing press delivery drive shaft, no substantial press modifications are required, and the press can be quickly and easily converted between coating and noncoating operation with no loss of printing capability of the final printing station.

Many other features and advantages of the present invention will become more apparent from the following detailed description take in conjunction with the accompanying drawings which disclose, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevational view of a sheet-fed, offset rotary printing press having a coating apparatus embodying the present invention;

FIG. 2 is an enlarged fragmentary side elevational view taken substantially within the circular area designated "2" in FIG. 1 and showing the coating apparatus of the present invention during coating operation;

FIG. 3 is a side elevational view similar to FIG. 2, but showing the coating apparatus in the inoperative posi-

tion with the coating pick-up roller and reservoir removed, and the blanket covering over the delivery cylinder replaced with a fabric net for non-coating printing;

FIG. 4 is an enlarged fragmentary perspective view showing one side of the coating apparatus mounted in the press and illustrating the fluid path of coating material from a supply tank to the reservoir of the coating unit;

FIG. 5 is an enlarged fragmentary perspective view illustrating the end mounting of the coating pick-up roller to its support bracket; and

FIG. 6 is an enlarged fragmentary sectional view taken substantially along the lines 6—6 of FIG. 4.

DETAILED DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENT

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line apparatus, herein generally designated 10, for selective use in applying a protective and/or decorative coating to the freshly printed surface of sheets printed in a sheet-fed, offset rotary printing press, herein generally designated 12. In this instance, as shown in FIG. 1, the coating apparatus 10 is illustrated as installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation "Heidelberg Speedmaster 102V (40")," and which includes a press frame 14 coupled at one end, herein the right end, with a sheet feeder 16 from which sheets, herein designated 18, are individually and sequentially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the finally printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical sheet printing stations 22, 24, 26 and 28 which can print different color inks onto the sheets as they are moved through the press 10.

As illustrated, each of the printing stations 22, 24, 26 and 28 is substantially identical and of conventional design, herein including a sheet feed cylinder 30, a plate cylinder 32, a blanket cylinder 34 and an impression cylinder 36, with each of the first three printing stations 22, 24, and 26 having a transfer cylinder 38 disposed to withdraw the freshly printed sheets from the adjacent impression cylinder and transfer the freshly printed sheets to the next printing station via a transfer drum 40. The final printing station 28 herein is shown as equipped with a delivery cylinder 42 which functions to support the printed sheet 18 as it is moved from the final impression cylinder 36 by a delivery conveyor system, generally designated 44, to the sheet delivery stacker 20.

The delivery conveyor system 44 herein is of conventional design and includes a pair of endless delivery gripper chains 46, only one of which is shown in the drawings, carrying at regular spaced locations along the chains, laterally disposed gripper bars 48 having gripper elements 50 used to grip the leading edge of a sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing station 28. As the leading edge of the sheet 18 is gripped by the grippers 50, the delivery chains 46 pull the sheet away from the impression cylinder 36 and convey the freshly printed sheet to the sheet delivery stacker 20 where the grippers release the finally printed sheet. The endless delivery chains 46 are driven in synchronous timed relation to the impression cylinder 36 by sprocket wheels 52 fixed adjacent the lateral ends of a delivery drive shaft 54 which has a mechanically geared coupling (not shown) through the press drive system to the impression cylinder. The delivery drive shaft 54 extends laterally between the sides of the press frame 14 adjacent the impression cylinder 36 of the last printing station 28, and is disposed to be parallel with the axis of the impression cylinder. In this instance, the delivery cylinder 42, which is constructed to allow adjustments in diameter by suitable means, is fixedly mounted to the delivery drive shaft 54 so that the delivery cylinder is also rotated in precise timed relation to the impression cylinder.

Preferably, each of the transfer cylinders 38 is equipped with an anti-marking system such as the aforementioned net type transfer cylinder system or the press 12 can be supplied in the transfer positions with vacuum transfer systems of the type disclosed in the above-identified copending U.S. application Ser. No. 07/630,308 filed Dec. 18, 1990, although as will become more apparent hereinafter, the use of such transfer systems is not required for the present invention and other types of transfer systems can be used. For reasons that will become more apparent hereinafter, for most effective use of the present invention, however, the delivery cylinder 42 should be of the type which employs the "SUPER BLUE" delivery cylinder system, or, as an alternative, should employ in the delivery position, a vacuum transfer system such as disclosed in the above-identified copending U.S. application Ser. No. 07/630,308.

In this respect, it is important to note that when the freshly printed sheets 18 are conveyed away from the impression cylinder 36 of the final printing station 28 by the gripper 50 carried by the delivery chains 46, the wet inked surfaces of the sheets face the delivery drive shaft 54 and the sheets must be supported such that the ink is not marked or smeared as the sheets are transferred. Typically, such support is provided by skeleton wheels or cylinders mounted to the press delivery drive shaft 54, or as is now more commonly used, net type delivery cylinders such as of the "SUPER BLUE" delivery cylinder system type disclosed in the aforementioned DeMoore patent. More recently, vacuum transfer apparatus of the type disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308 have been used in place of delivery cylinders or skeleton wheels to pull the unprinted side of the sheet away from the delivery drive shaft 54 so that the wet ink surface of the sheets do not come into contact with any press apparatus. It has been found, however, that when a protective or decorative coating material is applied to the wet ink surface of the sheets, the coating protects the wet ink against marking and smearing such that the coating applicator roller itself can be used to support the wet inked surface of the sheets without fear of damage to the freshly printed surface.

In accordance with the present invention, the in-line coating apparatus 10 for selectively applying the protective or decorative coating to the sheets 18 enables the press 12 to be operated in the normal manner without the loss of the final printing station 28, and without requiring any substantial press modifications by employing the existing press delivery drive shaft 54 as the mounting location for the coating applicator roller. In presses 12 utilizing a net type delivery cylinder system, that system can be quickly and easily converted to perform the dual function of being a coating applicator roller and a delivery cylinder. In presses having other

types of delivery systems such as skeleton wheels mounted on the delivery drive shaft 54 or a vacuum transfer apparatus as disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308, conversion to a coating operation can be quickly and easily achieved by mounting on the press delivery drive shaft in place of the skeleton wheels or in addition to the vacuum transfer apparatus, a suitable support cylinder capable of performing the combined function of a coating applicator roller and a delivery cylinder 42. Typically, such a support cylinder will have a diameter which provides no more than about a 0.090 inch clearance between the cylinder support surface and the adjacent impression cylinder 36. By utilizing the delivery cylinder 42 mounted on the delivery drive shaft 54 to also act as a coating applicator roller, the present invention insures that the coating will be applied to the printed sheet 18 in precise timed registration, and will permit the press to be operated with its full range of printing stations, yet allow fast, simple and convenient change-over from coating to noncoating operations, and vice versa, with a minimum of press down time.

Toward these ends, the coating apparatus 10 of the present invention includes a relatively simple, positive acting and economical coating unit, generally designated 60, mounted to the press frame 14 down stream of the delivery drive shaft 54 and positioned to selectively supply coating material to the support surface of a delivery cylinder 42 mounted on the delivery drive shaft. As best can be seen in FIGS. 2, 4 and 6, the coating unit 60 herein comprises a pair of side frames 62, only one of which is shown, it being understood that the other side frame is substantially the same as that of the side frame illustrated, attached to each side of the press frame 14. Pivotally mounted to one end of each of the side frames 62 is a support bracket 64 carrying one end of a coating material reservoir 66 and cooperating coating material pick-up roller 68 each disposed to extend laterally across the press 12 parallel with the delivery drive shaft 54. The coating unit 60 is mounted between the upper and lower runs of the delivery chains 46 down stream of the delivery drive shaft 54, and positioned so that the outer peripheral surface 70 of the pick-up roller 68 can be frictionally engaged with the support surface of a delivery cylinder 42 mounted on the delivery drive shaft.

As best seen in FIGS. 2 through 4, the support bracket 64 is pivotally attached to the end of the side frame 62 by a shaft 72 disposed at the lower end portion of the bracket, and can be pivoted about the shaft by an extensible cylinder 74, herein shown as a hydraulic cylinder, one end 76 of which is secured such as by welding to the side frame, and the opposite end 78 of which is coupled through a pivot shaft 79 to the upper end portion of the bracket. By extending or retracting the cylinder 74, the extent of frictional engagement of the pick-up roller 68 with the surface of the delivery cylinder 42 can be controlled, and the pick-up roller can be completely disengaged from the delivery cylinder.

The coating pick-up roller 68, which can be of conventional design and preferably one such as the Anilox rollers manufactured by A.R.C. International of Charlotte, N.C., and sold under the name "PRINTMASTER" having an engraved ceramic or chrome outer peripheral surface 70, is designed to pick up a predetermined uniform thickness of coating material from the reservoir 66, and then uniformly transfer the coating to the support surface of the delivery cylinder 42. To effect rotation of the pick-up roller 68, a suitable motor 80, herein a hydraulic motor, is attached to one of the side frames 62 and coupled to a suitable hydraulic fluid source (not shown) through fittings 81. Attached to the output of the motor 80 is an output gear which is drivingly coupled through a reduction gear 81 and a series of idler gears 82 each mounted on stub axles 84, to a drive gear 86 attached to the end of a shaft 88 on which the pick-up roller 68 is concentrically mounted. The shaft 88 of the pick-up roller 68 is, in turn, journaled at each end to the brackets 64 through a releasable semicircular collar 90 (see FIG. 5) attached by bolts 92 to the bracket. Herein, the axle of the terminal idler gear, designated 82', also serves as the shaft 72 for pivotally mounting the support bracket 64 to the side frame 62 so that when the bracket is rotated about the shaft, the terminal idler gear remains engaged with the drive gear 86 of the pick-up roller 68.

In this instance, as best as can be seen in FIG. 6, the pick-up roller 68 has a portion which projects laterally into the reservoir 66 containing the supply of coating material, and a pair of upper and lower inclined doctor blades 94 and 96 attached to the reservoir engage the roller surface to meter the coating material picked up from the reservoir by the etched surface 70 of the roller. The reservoir 66 herein is formed by an elongated, generally rectangular housing 98 having a generally C-shaped cross-section with a laterally extending opening 100 along one side facing the pick-up roller 68, and is supplied with coating material from a supply tank 102 disposed in a remote location within or near the press 12. Preferably, the reservoir 66 is removably attached to the brackets 64, herein by bolts 104 having enlarged, knurled heads 106, and which can be threaded through slots 108 formed in the brackets to clamp the reservoir in place on the brackets.

To insure that an adequate supply of coating material is always present within the reservoir 66 and to prevent coagulation and clogging of the doctor blades 94 and 96 by the aqueous coating material, the coating material is circulated through the reservoir, herein by two substantially identical pumps 110 and 112, one of which pumps coating material from the supply tank 102 via a supply line 114 to the bottom of the reservoir, and the other of which acts to provide suction to a pair of return lines 116 coupled adjacent the top of the reservoir for withdrawing unused coating material from the reservoir. By circulating the coating material from the supply tank 102 at a greater rate than the rate of withdrawal of material by the pick-up roller 68, a substantially constant supply of coating material will always be present within the reservoir 66.

In this instance, the general arrangement of the pick-up roller 68, doctor blades 94 and 96, and reservoir 66 is substantially like that disclosed in U.S. Pat. No. 4,821,672 entitled DOCTOR BLADE ASSEMBLY WITH ROTARY END SEALS AND INTERCHANGEABLE HEADS", the disclosure of which can be reviewed for details concerning the structure and operation of a pick-up roller and reservoir usable with the present invention.

Once the coating unit 60 has been installed in a press 12, which basically only requires that the side frames 62 be attached, such as with bolts, to the sides of the press frame 14, and the hydraulic motor 80 be coupled with a suitable hydraulic source, the press can be quickly and easily converted to the coating mode. In presses 12 already supplied with a net type delivery cylinder sys-

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tem, to convert to a coating operation, all that is necessary is that the fabric net material (designated 122 in FIG. 3) normally used over the support surface of the net type delivery cylinder during noncoating press operations, be removed and replaced with a coating blanket 124 capable of transferring coating material deposited thereon onto the printed sheets. Typically, such a blanket 124 can be formed as a rubber covering such as used for the covering surface of the conventional blanket cylinders 34 of the press 12. In presses 12 having conventional skeleton wheels or a vacuum transfer type apparatus such as that of the aforementioned copending U.S. application Ser. No. 07/630,308, a suitable delivery cylinder 42 can be fixed to the delivery drive shaft 54 and a similar coating blanket 124 applied thereto over the cylinder surface.

It is important to note that during nonprinting operations, the net type delivery cylinder 42 does not engage the surface of the impression cylinder 36 during sheet delivery However, when used as a coating applicator roller during coating operations, the effective diameter of the delivery cylinder 42 must be increased so that the coating blanket 124 presses the sheet 18 against the surface of the impression cylinder 36, as shown in FIG. 2. To increase the effective diameter of the delivery cylinder 42, the thickness of the coating blanket 124 applied over the support surface of the delivery cylinder 42 can be selected to correspond with the thickness of the sheets 18 to be printed, or suitable packing sheets, such as paper sheets (not shown) of the type conventionally used in conjunction with press blanket cylinders 34, can be interposed between the delivery cylinder and the coating blanket.

While any suitable means can be used to attached the coating blanket 124 to the support surface of the delivery cylinder 42, in this instance, as shown in FIGS. 2 and 3, the delivery cylinder is supplied with clamps 126 attached by bolts 127 to the cylinder adjacent the leading edge 130 to secure the leading edge of the coating blanket 124 to the cylinder, and adjustable tensioning clamps 128 are provided adjacent the cylinder trailing edge 132 for securing the trailing edge of the blanket to the cylinder. However, the tensioning claims 128 are pivotally mounted at one end by a pin 129 to the cylinder 42, and the blanket tension is adjusted through a bolt 131 and nut 133 arrangement. Depending upon the thickness of the sheets 18 to be printed and coated by the press 12, one or more layers of packing paper or the like may be interposed between the support surface of the delivery cylinder 42 and the coating blanket 124 to increase the effective diameter of the cylinder. Provision of the tensioning clamps 128 for attaching the coating blanket 124 to the leading edge 132 of the delivery cylinder 42 allows for such control and adjustment.

Once installed, the coating unit 60 can remain in position even though the press 12 is operated in the non-coating mode. In this respect, when the coating unit 60 is not in operation, the extensible cylinder 74 can be actuated to pivot the support brackets 64 carrying the pick-up roller 68 and reservoir 66 about the shaft 72 and away from the delivery cylinder 42, thus rendering the coating unit inoperative. This then also frees the pick-up roller 68 and reservoir 66 for fast and easy removal from the coating unit 60 for cleaning, service or replacement. To remove the pick-up roller 68, the coating material is drained from the reservoir 66, and the pressure exerted by the doctor blades 94 and 96 against the roller is released, therein through operation of a pressure adjustment screw 120 attached to the reservoir, and the bolts 92 and collars 90 are removed, thereby permitting the pick-up roller to be lifted from the coating unit 60. To remove the reservoir 66, all that need be done is to release the mounting bolts 104 securing the reservoir to the brackets 64. With the coating unit 60 moved by the extensible cylinder 74 to the inoperative position, the delivery cylinder 42 can be converted for normal delivery cylinder operation simply by removing the coating blanket 124 from the delivery cylinder 42 and replacing the blanket with a fabric net 122. Alternatively, if a vacuum transfer apparatus such as described in the aforementioned copending U.S. application Ser. No. 07/630,308 is installed in the press 12, that apparatus can be activated to deliver sheets from the impression cylinder 36 without effecting any delivery cylinder change since the freshly printed side of the sheets will not come into contact with the delivery cylinder.

In a typical noncoating operation of the press 12 with the coating apparatus 10 installed, the coating unit 60 will be in the inoperative position. In that situation and with a net type delivery cylinder 42 installed, the delivery cylinder will be covered with the fabric net 122 so that the delivery cylinder operates in the normal manner with the wet ink side of the freshly printed sheets 18 being supported by the net covered surface of the delivery cylinder. Should the press 12 include a vacuum transfer apparatus such as disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308, the delivery cylinder 42 can remain on the delivery drive shaft 54, with or without a fabric net 122, depending upon whether or not the press is used for perfector printing.

When it is desired to convert to the coating mode of operation, the press 12 is stopped just long enough to replace the fabric net 122 on the delivery cylinder 42 with the coating blanket 124 packed to the required extent necessary for providing the proper pressure to effect coating of the sheet thickness to be printed. Thereafter, the pumps 110 and 112 are activated and the press 12 re-started. The extensible cylinder 74 can then be activated to control the pressure of the pick-up roller 68 against the delivery cylinder 42 to obtain the desired application of coating material to the freshly printed sheets 18.

Notably, with the coating apparatus 10 of the present invention, no timing adjustments between the delivery cylinder 42 and the impression cylinder 36 are required to achieve and maintain precise registration between application of the coating material and the printed surface of the sheets 18. Further, the coating unit 60 permits a wide range of coating weights to be applied to the printed sheets 18 by quickly and easily changing pick-up rollers 68 from those designed to produce a very light coating application to those designed to produce a very thick coating application can be used.

From the foregoing, it should be apparent that the coating apparatus 10 of the present invention provides a highly reliable, effective and economical in-line apparatus for selectively applying coating material to the freshly printed sheets 18 in a sheet-fed, offset rotary printing press 12 which allows the final printing station to continue to be used as a print station, yet which does not require any substantial press modification or the addition of a separate timed applicator roller. While a particular form of the present invention has been illustrated and described, it should be apparent that varia-

tions and modifications therein can be made without departing from the spirit and scope of the invention.

We claim:

1. In a sheet-fed, offset rotary printing press of the type including at least one printing station having a blanket cylinder and an impression cylinder disposed for printing ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery conveyor system including a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder and driven in timed synchronous relation with the impression cylinder, the improvement comprising:

a delivery cylinder mounted to said delivery drive shaft and having an outer peripheral support surface adapted to engage and support a sheet being transported by said delivery conveyor system;

a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape, and means for applying a coating of liquid coating material from said supply onto said outer peripheral surface of said pick-up roller; and

means for mounting said coating apparatus to the press adjacent said delivery cylinder including selectively operable means for moving said pick-up roller between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said support surface of said delivery cylinder, and a second inoperable position with said peripheral surface out of engagement with said support surface of said delivery cylinder, whereby when said pick-up roller is in said first operable position, liquid coating material from said supply applied onto said peripheral surface of said pick-up roller is transferred to said support surface of said delivery cylinder and to said freshly printed sheet.

2. The improvement as set forth in claim 1 wherein said delivery cylinder includes a coating blanket disposed over said peripheral support surface.

3. The improvement as set forth in claim 1 wherein said delivery cylinder includes a removable coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position.

4. The improvement as set forth in claim 3 wherein said coating blanket has a rubber outer surface.

5. The improvement as set forth in claim 3 wherein said delivery cylinder includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

6. The improvement as set forth in claim 1 wherein said coating apparatus includes an elongated reservoir containing said supply of liquid coating material, said reservoir being disposed to extend parallel with said pick-up roller with a portion of said peripheral surface extending into said reservoir in contact with liquid coating material contained therein, and at least one doctor blade attached to said reservoir and engaging said peripheral surface, said doctor blade acting to limit the amount of liquid coating material applied onto said peripheral surface from said reservoir.

7. The improvement as set forth in claim 6 wherein said reservoir and said pick-up roller are movably coupled to said press and said selectively operable means includes an extensible cylinder coupled between said reservoir and said press and operable to move said reservoir and said pick-up roller between said first and second positions.

8. The improvement as set forth in claim 7 wherein said pick-up roller is rotatably driven by a motor attached to said coating apparatus.

9. The improvement as set forth in claim 8 wherein said delivery cylinder includes a rubber coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position, and includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

10. The improvement as set forth in claim 9 wherein said coating apparatus is mounted to said press downstream of said delivery drive shaft in the direction of travel of said sheets during transport by said delivery conveyor system.

11. The improvement as set forth in claim 1 wherein said mounting means includes first and second side frames mounted on said press, a support shaft mounted on and extending between said first and second side frames, a support bracket attached to said coating apparatus and movably coupled to said support shaft for pivotal movement between said first and second positions, and said selectively operable means includes an extensible cylinder coupled between said coating apparatus and said support bracket and operable to move said coating apparatus toward and away from said delivery cylinder.

12. In a sheet-fed, offset rotary printing press of the type including at least one printing station having a blanket cylinder and an impression cylinder disposed for printing wet ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery conveyor system comprising a pair of endless gripper chains disposed on opposite sides of the press and supporting therebetween gripper bars and grippers spaced along the chains, the gripper chains being driven in timed synchronous relation with the impression cylinder by laterally spaced sprocket wheels mounted on opposite ends of a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder, the improvement comprising:

a delivery cylinder mounted to said delivery drive shaft between said sprocket wheels and having an outer peripheral support surface covered by a removable coating blanket adapted to engage and support the wet ink side of a sheet being transported by said gripper bars;

a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape communicating with said supply, and means for applying liquid coating material from said supply onto said peripheral surface of said pick-up roller; and,

means for mounting said coating apparatus to the press adjacent the delivery cylinder, said means including selectively operable means for moving said coating apparatus between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said delivery cylinder, and a second inoperable position with said peripheral surface of said pick-up roller out of engagement with said delivery cylinder, whereby when said coating apparatus is in said first operable

position, liquid coating material from said supply metered onto said peripheral surface of said pick-up roller is transferred to said delivery cylinder and to said freshly printed sheet, and when said coating apparatus is in said second inoperable position, said delivery cylinder is disposed for non-coating sheet delivery operation.

13. The improvement as set forth in claim 12 wherein the effective diameter of said delivery cylinder covered by said coating blanket is sufficient to apply pressure to sheets against said impression cylinder as said sheets are pulled from said impression cylinder by said gripper bars.

14. The improvement as set forth in claim 13 wherein said coating blanket has a rubber outer support surface.

15. The improvement as set forth in claim 14 wherein said coating apparatus is disposed downstream of said delivery drive shaft in the direction of travel of said sheets during transport by said delivery conveyor system.

16. A sheet-fed, offset rotary printing press including:

at least one printing station having a blanket cylinder and an impression cylinder disposed for printing wet ink onto sheets passing therebetween;

a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery system including a delivery drive shaft;

a delivery cylinder mounted to said delivery drive shaft and having an outer peripheral support surface adapted to engage and support a sheet being transported by said delivery conveyor system;

a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape communicating with said supply, and means for applying liquid coating material from said supply onto said peripheral surface of said pick-up roller; and

means for mounting said coating apparatus to the press adjacent said delivery cylinder, said means including selectively operable means for moving said pick-up roller between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said delivery cylinder, and a second inoperable position with said peripheral surface of said pick-up roller out of engagement with said delivery cylinder, whereby when said pick-up roller is in said first operable position, liquid coating material from said supply applied to said peripheral surface of said pick-up roller is transferred to said delivery cylinder and then to said freshly printed sheet.

17. A sheet-fed, offset rotary printing press as set forth in claim 16 wherein said delivery cylinder includes a removable coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position.

18. A sheet-fed, offset rotary printing press as set forth in claim 17 wherein said coating blanket has a rubber outer surface.

19. A sheet-fed, offset rotary printing press as set forth in claim 17 wherein said delivery cylinder includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

20. A sheet-fed, offset rotary printing press as set forth in claim 19 wherein said coating apparatus includes an elongated reservoir containing said supply of liquid coating material, said reservoir being disposed to extend parallel with said pick-up roller with a portion of said peripheral surface extending into said reservoir in contact with liquid coating material contained therein, and at least one doctor blade attached to said reservoir and engaging said peripheral surface, said doctor blade acting to limit the amount of liquid coating material applied onto said peripheral surface from said reservoir.

21. A sheet-fed, offset rotary printing press as set forth in claim 20 wherein said selectively operable means includes an extensible cylinder coupled between said reservoir and said press and operable to move said reservoir and said pick-up roller laterally between said first and second positions.

22. A sheet-fed, offset rotary printing press as set forth in claim 21 wherein said pick-up roller is rotatably driven by a motor attached to said coating apparatus

* * * * *

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September 20, 2000

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Ch. König

(Christian König)

Sheet-fed Offset
process technology

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Before the author draws the attention of the experts to the technical aspects of the new golden era in offset printing, we shall deal with the introductory seminars, which preceded the Dortmund practical demonstration on a Fünffarben Roland 700.
Dr. Andreas Altmeyer, spokesperson of the management of Busche Unternehmensgruppe, made it clear in his statements that the printing trade is characterized by a rapid development of technology and the possibilities it presents, and that in changing markets one is forced to think and act in innovative ways, in combination with paying attention to environmental issues. Based on this background, Busche decided a long time ago not only to have an offensive concept in environmental issues, but to make use of the outstanding knowledge of its employees to invest in new technologies, machines, and plants This led to the cooperation with MAN Roland and Michael Huber for the development of a novel gold printing process for sheet-fed offset printing that is unique in the world. To emphasize the value of a product, gold- and silver effects of high gloss and brilliance on the packaging are still very important. Up to now, high-quality metallic effects could only be created using intaglio printing with solvent-containing inks, using the expensive hot-foil relief printing, or using the expensive bronzing in a separate processing step. Dr. Altmeyer declared Klaus Rietzler, head of the development division "Process technology", the father of a technology developed in the firm Busche to apply gold printing ink onto the print sheet, which almost reaches the quality of traditional classic bronzing. But this does not take place in a separate printing step, but is achieved in an inline-production in combination with the color printing. Extremely helpful assistance in the multi-year development work was obtained from the Druckfarbenfabrik Michael Huber where one based gold printing ink on an aqueous fixing agent system, and from MAN Roland where one developed a special coating module for the new gold technology and presented it as a world novelty in the firm Busche, in combination with a Roland 705.
Dr. Altmeyer used the world premiere of the new gold generation, to also briefly illustrate other environmental activities as integral parts of the company's philosophy. The company also wants to indicate a direction and point the way for other companies. He mentioned the modern thermal post-combustion unit for reel-fed offset printing, and the part played in the creation of a guideline for a commercial waste management concept and waste material accounting by the Swiss Prognos Institute, in a contract from the ministry for environment, regional planning, and agriculture of North Rhine-Westphalia. This guideline has now been circulated by the ministry. As companion material, Busche has developed a special computer program, which can be obtained in combination with a manual on computer disk for a minimal fee from the Busche Verlagsgesellschaft.

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Schematic diagram of the Fünffarben Roland 700 with two coating modules at the Druckerei Fritz Busche in Dortmund.

This results in a more planar contact of the gold platelets as an important condition for an optimized light reflection. This is a precondition for gloss and brilliance.

Not only do these conditions have to be met for a good gold effect, the quantities applied to the materials to be printed is of course also of importance. And herein lies – in the author's opinion – the second secret of the new gold technique. Printing does not take place indirectly in offset printing by means of an inking unit, but directly onto the sheet by means of a special flexo printing unit. I.e. this is a relief printing process. Due to little ink separation in the special coating module by MAN Roland, significantly more ink can be applied.

Due to this, according to statements made by Andrea Heinemann, larger metal pigments could be used for the 2-component "Acrylac" gold. Thus, the outstanding results are due to a combination of particle size and particle quantity, made possible by a saturated transfer to the relief form, and from there via a direct route to the surface of the material to be printed. Trials to further optimize the process for different requirements include the use of an anilox roller in combination with a doctor blade chamber, as is already common usage in flexo printing.

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Differentiated comparison chart for Acrylac inks for the shown processing characteristics.

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Andrea Heinemann summarizes the special characteristics of "Acrylac" gold :

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Even before the actual climax of the event arrived, a practical demonstration of the new generation of golds on a Fünffarben Roland 700, Cert. Eng. Martin Lange, member of the board responsible for distribution and service at MAN Roland, presented an introduction to some of the engineering details, in particular relating to the Roland 700. At first one was reminded how in the 70s, when the company name was still Faber&Schleicher, the company was involved in inline coating using water based dispersion coatings, and in 1979 offered three different applicator systems. In particular for printers of packaging, this offered economical and environmentally friendly production options.
This proven inline finishing concept by means of coating device, or coating unit, or coating unit with counter pressure, has been further developed in the Roland 700 and Roland 200 as the new coating module technology. But what is important today is not only the improvement of printed products by coating, but also, for psychological advertising reasons, gold and silver effects. At this point Lange listed the so far known options for generating gold effects, in particular the use of metallized papers, the printing of gold printing inks (1K and 2K inks) by the inking unit, the expensive powder bronzing, and the possibility to apply a high-quality gold printing ink on solvent basis using a separate sheet-fed intaglio printing press
At this point, Lange informed the international press that MAN Roland has entered into a cooperation for assembly, distribution, and service for the sheet-fed intaglio printing press RK-TD with the firm Billhofer in Nürnberg, a provider of specialized machinery for surface converting.
The economical answer of the MAN Roland manager to the new "Busche Gold" was a traditional powder bronzing. He provided more detail using a five-color project with a print conversion by gold printing ink, and a subsequent dispersion coating. For this a Fünffarben Roland 700 with two coating modules is needed. One of the coating modules contains the flexo printing unit for gold printing ink, and the second module is the actual coating module to achieve an improved fixing of the gold pigments.

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Structure of a traditional gold printing ink. The reflectivity, and thus the brilliance, is negatively affected by comparatively small metal pigments, which are also surrounded by fixing agents.

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Thus one is dealing with a so-called hybrid machine executing two printing processes: offset printing for colors and relief printing (flexo printing) for gold printing.
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But the 'old' bronzing method is significantly more expensive, since for a 5-color process with gold one requires, in addition to a Fünffarben (Five color (The Translator)) machine, a bronzing machine, including an offset machine for the transfer of the golden base print ink, and finally also a further separate pass for applying a top coat of lacquer. Lange: In addition, the production speed in bronzing is very slow compared to that of the inline production of the Busche concept. This would increase a project's cycle time and would increase personnel costs. The framework of the EC guidelines more and more calls for metal effects with fewer heavy metals, and thus gold and silver coatings on an aqueous basis, as used in "Busche Gold", are preferable for environmental reasons.

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New impulses for offset

The practical demonstration of the golden Busche invention was impressive and absolutely convincing. The author knows what he is reporting about: He himself has in past times used bronzing and got to know the practical problems. Hereby he also witnessed in many printing runs the qualitative descent of the gold printing inks being printed by the inking unit. They did not appear glossy enough, in combination with the required water flow they tended to emulsify, and also the drying left much to be desired. With the Roland 705, Busche not only demonstrated the offset technology of the future, but – in combination with the flexo and coating module by MAN Roland – the "golden future". No dust of bronzing powders, no emulsifying or build-up, but outstanding gold effects in intaglio printing quality in combination with excellent adhesion to the surface of the used cardboard, since, after a very short intermediate drying step, a final coating on aqueous basis is applied.
In the fine-tuning of the combination of offset printing and flexo printing, i.e. development offset plates and flexo printing plates (Cyrel), there will most certainly be problems to solve, here and there. But for the author, a "tried and tested" offset expert, this does not change the fact that again practical experts have given fresh, strong impulses to offset printing, which will pay off especially for Busche. They are ahead by a golden length of the nose, indeed.

Following document: ‘K1A’ , enlarged detail of page 13 of K1

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/Image/

New impulses for offset

The practical demonstration of the golden Busche invention was impressive and absolutely convincing. The author knows what he is reporting about: He himself has in past times used bronzing and got to know the practical problems. Hereby he also witnessed in many printing runs the qualitative descent of the gold printing inks being printed by the inking unit. They did not appear glossy enough, in combination with the required water flow they tended to emulsify, and also the drying left much to be desired. With the Roland 705, Busche not only demonstrated the offset technology of the future, but – in combination with the flexo and coating module by MAN Roland – the "golden future". No dust of bronzing powders, no emulsifying or build-up, but outstanding gold effects in intaglio printing quality in combination with excellent adhesion to the surface of the used cardboard, since, after a very short intermediate drying step, a final coating on aqueous basis is applied.
In the fine-tuning of the combination of offset printing and flexo printing, i e. development offset plates and flexo printing plates (Cyrel), there will most certainly be problems to solve, here and there. But for the author, a "tried and tested" offset expert, this does not change the fact that again practical experts have given fresh, strong impulses to offset printing, which will pay off especially for Busche. They are ahead by a golden length of the nose, indeed.

Following document: ‘K1A’ , enlarged detail of page 13 of K1

/Diagram/

The Fünffarben Roland 700 for the inline-conversion using Acrylac-Gold or Acrylac–Silver is equipped with two coating modules. The coating module for the gold or silver application employs a new development by DuPont, the Cyrel C-M photo polymer plate, which was developed especially for this application.

Much interest and animated discussions surrounding the “Busche gold” on a Fünffarben Roland 700 with two coating modules.

Schematic diagram of the Fünffarben Roland 700 with two coating modules at the Druckerei Fritz Busche in Dortmund.

AKTUELL

OFFSETPRAXIS

BOGENOFFSET
VERFAHRENSTECHNIK

„Dialog in Gold"

Busche zeigt Innovation für den Offset in Dortmund

Nahezu zeitgleich wurde Ende Januar bei der Druckerei Busche in Dortmund auf dem Stuttgarter Druckforum ein neues Golddruckverfahren vorgestellt. Es basiert auf der Verwendung von Offsetgoldfarbe auf der Grundlage wässriger Bindemittel und wurde gemeinsam von der Busche Unternehmensgruppe, der Farbenfabrik Michael Huber München, der DuPont de Nemours (Deutschland) GmbH sowie der MAN Roland Druckmaschinen AG, Offenbach entwickelt. Die Dortmunder Premiere hat für die OP-Leser Ing. Wolfgang Walenski beobachtet.

Ende Januar lud die Druckerei Busche, Dortmund unter der eher schlichten Überschrift „Dialog in Gold" zu einer internationalen Pressekonferenz ein. Der Dialog war aber alles andere als schlicht. Denn dahinter verbarg sich eine Innovation, die der Offsetwelt wieder neue Impulse geben und deren Marktanteil nicht nur sichern, sondern für die Zukunft auch erweitern wird. Es ging bei dem „Dialog in Gold" um eine Technologie, bei der nach dem mehrfarbigen Offsetdruck Inline im gleichen Arbeitsgang ein wirtschaftlicher, aber hochqualitativer Golddruck in einer bisher in dieser Technik nicht erreichten Brillanz praktiziert werden kann. Das „neue Gold" wurde bei Busche vorgestellt als Gemeinschaftsentwicklung des Hauses Busche mit MAN Roland und der Druckfarbenfabrik Michael Huber. Dabei ist der Kernpunkt der „Innovation durch Partnerschaft" das angemeldete Verfahrenspatent von *Klaus Kietzler*, dem Leiter der Entwicklungsabteilung „Verfahrenstechnologie" im Hause Busche und *Andrea Heinemann*, Abteilung „Produktentwicklung" bei Michael Huber München.

Bevor der Verfasser das Interesse der Fachleute auf die technischen Aspekte der neuen Goldära des Offsetdrucks lenkt, soll auf die einführenden Referate eingegangen werden, die den Dortmunder Praxisvorführungen auf einer Fünffarben-Roland 700 vorangestellt wurden. *Dr. Andreas Altmeyer*, Sprecher der Geschäftsführung der Busche Unternehmensgruppe, machte in seinen Ausführungen deutlich, daß die Druckbranche gekennzeichnet ist von einer rasenden Entwicklung technologischer Möglichkeiten und die wandelnden Märkte zu innovativem Denken und Handeln gezwungen sind, verbunden mit der Berücksichtigung des Umweltschutzes. Vor diesem Hintergrund habe sich Busche schon frühzeitig entschlossen, nicht nur ein offensives Umweltkonzept zu praktizieren, sondern zusammen mit dem hervorragenden Wissen der Mitarbeiter auch in neue Technologien, Maschinen und Anlagen zu investieren. Dies führte in Zusammenarbeit mit MAN Roland und Michael Huber zur Entwicklung eines weltweit einmaligen neuen Golddruckverfahrens für den Bogenoffsetdruck. Denn nach wie vor sind Gold- und Silbereffekte auf Verpackungen oder Etiketten mit hohem Glanz und hoher Brillanz zur Unterstreichung der Wertigkeit einer Ware von großer Wichtigkeit. Metallische Effekte von hoher Qualität ließen sich bisher nur im Tiefdruck mit lösemittelhaltigen Farben, im kostenintensiven Heißfolienprägedruck oder mit der aufwendigen Bronzierung in einem separaten Arbeitsgang bewältigen. Dr. Altmeyer bezeichnete Klaus Kietzler, den Leiter der Entwicklungsabteilung „Verfahrenstechnologie" als den Vater einer im Hause Busche erarbeiteten Technik, eine Golddruckfarbe auf den Druckbogen zu bringen, die fast an die Qualität der traditionellen, klassischen Bronzierung heranreicht. Das erfolgt nicht etwa in einem separaten Druckvorgang, sondern als Inline-Fertigung zusammen mit dem Farbdruck. Sehr hilfreiche Unterstützung fand man bei dieser mehrjährigen Entwicklungsarbeit bei der Druckfarbenfabrik Michael Huber, die Golddruckfarbe auf einem wässrigen Bindemittelsystem aufbaute und bei MAN Roland, wo ein spezielles Lackmodul für die neue Goldtechnik entwickelt wurde und im Hause Busche als Weltneuheit – in Verbindung mit einer Roland 705 – präsentierte.

Dr. Altmeyer nahm die Weltpremiere der neuen Goldgeneration zum Anlaß, auch die anderen Umweltaktivitäten als Bestandteil der Unternehmensphilosophie kurz darzustellen. Man möchte Zeichen setzen, und richtungsweisend auch für andere Unternehmen sein. So wurde die moderne thermische Nachverbrennungsanlage für den Rollenoffsetdruck erwähnt und die Mitwirkung bei der Anfertigung eines Leitfadens für ein betriebliches Abfallwirtschaftskonzept und für eine Abfallbilanz durch das Schweizer Prognos Institut, im Auftrag des nordrheinwestfälischen Ministeriums für Umwelt, Raumordnung und Landwirtschaft. Inzwischen ist dieser Leitfaden vom Ministerium in Umlauf gebracht worden. Busche hat dazu ein spezielles EDV-Programm entwickelt, das zusammen mit einem Handbuch auf einer Diskette bei der Busche Verlagsgesellschaft gegen eine Schutzgebühr bezogen werden kann.

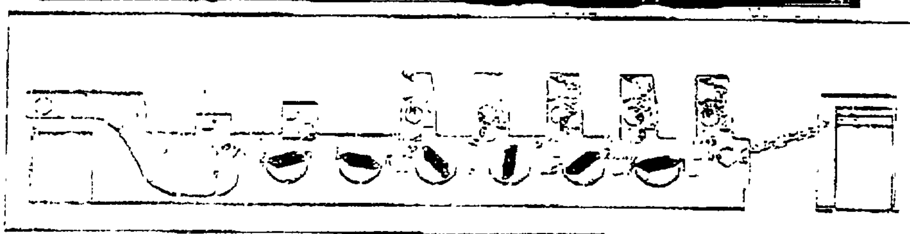
Hohe Priorität hat aber nach wie vor auch die Qualität, die für Busche einen ganz entscheidenden Wettbewerbsfaktor darstellt. Aus diesem Grunde will man den hohen Qualitätsstandard durch die Einführung des Qualitätssicherungssystems nach DIN/ISO 9000 zementieren.

Hervorragende Ergebnisse aus dem Zusammenspiel der Entwicklungspartner

Werner Ringel, Betriebsleiter der Busche Druckereigesellschaft, ging auf einige drucktechnische Aspekte der neuen Goldtechnologie ein. Der Initiator und Erfinder des Verfahrens, Klaus Rietzler, konnte wegen Krankheit an dieser Weltpremiere nicht teilnehmen. So faßte Ringel sich auch kurz und es klang in seinen Ausführungen deutlich durch, welche Anstrengungen, Schulungen und Umdenkungsprozesse notwendig waren, bei Busche nicht nur vom Großformat auf das „handlichere" 3 B-Format umzusteigen, sondern auch vom Offsetdruck auf das direkt arbeitende Flexodruckverfahren. Dabei wurde vor allen Dingen das notwendige Handling der Flexo-Platten (Cyrel/DuPont) erwähnt.

Harald Weberbauer, Abteilungsleiter „Verkauf Offsetfarben" von Michael Huber, besonders aber *Dipl.-Ing. Andrea Heinemann*, zuständig für die Produktentwicklung „Wässrige Systeme" bei Michael Huber und Mit-Erfinderin der europaweit zum Patent angemeldeten „Acrylac"-Gold- bzw. Silberdruckfarben, gingen dann auf die mit Spannung erwarteten weiteren Einzelheiten über das neue Gold ein. Dabei erläuterte Andrea Heinemann zunächst die Nachteile der bekannten Verfahren mit metallisierten Bedruckstoffen, mit der Bronzierung, dem Prägefoliendruck und beim Tiefdruck. Daraus entwickelten sich die Vorteile, die sich bei der Neuentwicklung einer Golddruckfarbe ergeben müßten. Das Ergebnis der Entwicklungsarbeit war ein „Acrylac"-Gold auf wässriger Basis. Man hat sich bei Michael Huber sehr eingehend mit der Herstellungsweise der Metallpigmente, ihrer Teilchengröße und deren Einfluß auf die Deckkraft und Brillanz auseinandergesetzt. Denn alle diesbezüglichen Untersuchungsergebnisse dokumentierte Andrea Heinemann durch übersichtliche und einleuchtende Diagramme. Entscheidend scheint dem Verfasser besonders die Erkenntnis zu sein, daß das wässrige Bindemittel beim neuen „Acrylac"-Gold ein günstigeres Aufschwemmverhalten für die Metallpigmente bietet, als bei den traditionellen Offsetbindemitteln. Daraus resultiert ein planparalleles Aufliegen der Goldplättchen als wichtige Voraussetzung für eine optimale Reflektion des Lichtes. Sie ist die Voraussetzung für Glanz und Brillanz.

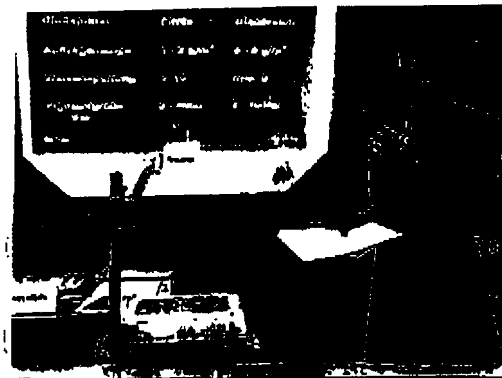
Neben dieser Voraussetzung für eine hohe Goldwirkung ist natürlich auch die Auftragsmenge, die auf die Oberfläche des Bedruckstoffes kommt, von Bedeutung. Und hier liegt – nach Verfasser-Meinung – das zweite Geheimnis der neuen Goldtechnik. Es wird nicht indirekt im Offsetdruck über ein Farbwerk gedruckt, sondern über ein spezielles Flexodruckwerk direkt auf den Druckbogen. Es wird also der Hochdruck praktiziert. Aufgrund geringerer Farbspaltung in dem speziellen Lackmodul von MAN Roland kann deutlich mehr Farbe übertragen werden. Dadurch konnten nach Angaben von Andrea Heinemann für das 2-Komponenten „Acrylac"-Gold auch größere Metallpigmente gewählt werden. Die hervorragenden Ergebnisse sind also ein Zusammenspiel von Teilchengröße und -menge, ermöglicht durch die satte Übertragung auf die Hochdruckform und von dort auf kurzem Weg auf die Oberfläche des Bedruckstoffes. Versuche zur weiteren Optimierung des Verfahrens an unterschiedliche Anforderungen umfassen auch den Einsatz einer Rasterwalze im Verbund mit einem Kammerrakelsystem, wie es im



Die Fünffarben Roland 700 für die Inline-Veredelung mit Acrylac-Gold bzw. -Silber ist mit zwei Lackmodulen ausgestattet. Im Lackmodul für den Gold- bzw. Silber-Auftrag kommt eine Neuentwicklung von DuPont, die speziell für diese Anwendung entwickelte Cyrel C-M-Photopolymer-Platte zum Einsatz

Großes Interesse und rege Diskussion um das „Busche-Gold" auf einer Fünffarben Roland 700 mit zwei Lackmodulen.

Schemazeichnung der Fünffarben Roland 700 mit zwei Lackmodulen bei der Druckerei Fritz Busche in Dortmund.



Verarbeitungseigenschaften von Golddruckfarben

Farbe	Pigment	[illegible]	Scheuer-festigkeit	[illegible]
Bronzierung	Cu / Zn		[illegible]	[illegible]
1-K-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]
2-K-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Gold	[illegible]	[illegible]	[illegible]	[illegible]
Acrylac-Gold	Cu / Zn	[illegible]	[illegible]	[illegible]

Dipl.-Ing. Andrea Heinemann, Michael Huber München, vermittelte als Mit-Erfinderin das „Busche-Gold" technische Details zum Aufbau der neuen Goldfarbe.

Differenziertes Vergleichs-Bild für die Acrylac-Farben bei den Verarbeitungsmerkmalen.

Klaus Rietzler, Leiter der Entwicklungsabteilung „Verfahrenstechnologie" im Hause Busche, erhält von Dipl.-Ing. Martin Lange, Vorstandsmitglied bei MAN Roland, die goldene Verdienstmedaille für seine Pionierarbeit um das „Neue Gold".

Flexodruck bereits vielfach Anwendung ~~findet. Andrea Heinemann faßt die Be~~sonderheiten von „Acrylac"-Gold so zusammen:

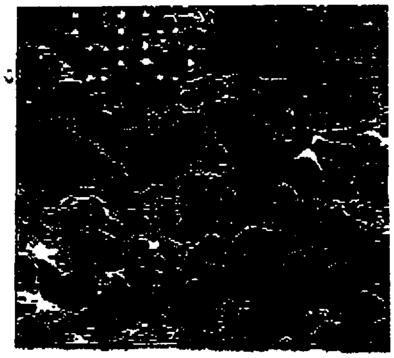
- Möglichkeit der Inline-„Bronzierung" in der Offsetmaschine,
- Umweltverträglichkeit, da das Bindemittel auf Wasserbasis aufgebaut ist,
- Geruchsarmut,
- großer Einsatzbereich für Verpackungen und Etiketten,
- Goldeffekte in der Brillanz wie im Tiefdruck.

MAN Roland mit hohem Erfahrungspotential bei der Inline-Lackierung

Bevor man zum eigentlichen Höhepunkt der Veranstaltung kam, zur praktischen Vorführung der neuen Goldgeneration auf einer Fünffarben Roland 700, gab *Dipl.-Ing. Martin Lange*, Vorstandsmitglied Vertrieb und Service von MAN Roland, eine Einführung in einige maschinentechnische Details, vor allen Dingen, was die Roland 700 anbetrifft. Dabei wurde aber zunächst in Erinnerung gerufen, daß man sich bereits in den 70er Jahren, als man noch Faber & Schleicher hieß, mit der Inline-Lackierung unter Verwendung von wässrigen Dispersionslacken beschäftigt hat und 1979 drei verschiedene Applikationssysteme anbot. Dadurch wurden vor allen Dingen für den Verpackungsdrucker wirtschaftliche und umweltfreundliche Produktionsmöglichkeiten geschaffen.

Diese bewährte Inline-Finishing-Konzeption mit Hilfe von Lackiereinrichtung, Lackwerk oder Lackiereinheit bzw. Lackiereinheit mit Widerdruck, ist für die Roland 700 und Roland 200 zur neuen Lackmodultechnik weiterentwickelt worden. Aber es geht heute ja nicht allein nur um die Verbesserung der Druckprodukte durch Lackierung, sondern aus werbepsychologischen Gründen auch um Gold- und Silbereffekte. Hier führte Lange dann die bekannten bisherigen Möglichkeiten der Erzeugung von Goldeffekten auf, bestehend aus der Verwendung von metallisierten Papieren, den Druck von Golddruckfarben (1-K- und 2-K-Farben), die über das Farbwerk aufgedruckt werden, die aufwendige Puderbronzierung, und die Möglichkeit, auf einer separaten Bogentiefdruckmaschine eine gute Golddruckfarbe auf Lösemittelbasis aufzubringen.

An dieser Stelle informierte Lange die internationale Presse darüber, daß MAN Roland für ihre Bogentiefdruckmaschine RK-TD mit der Firma Billhöfer in Nürnberg, als Anbieter von Spezialmaschinen für die Oberflächenveredelung, eine Kooperation für Montage, Vertrieb und Service dieser Maschinen eingegangen ist. Dem neuen „Busche-Gold" stellt der MAN Roland-Manager wirtschaftlich eine traditionelle Puder-Bronzierung gegenüber. Er verdeutlichte das an einer fünffarbigen Arbeit mit einer Druckveredelung durch Golddruckfarbe und anschließender Dispersionslackierung. Dafür wird eine Fünffarben Roland 700 mit zwei Lackmodulen gebraucht. Davon beinhaltet das eine Lackmodul das Flexodruckwerk für die Golddruckfarbe, und das zweite Modul ist das eigentliche Lackmodul für die noch bessere Fixierung der Goldpigmente. Man hat es also mit einer sogenannten Hybrid-



Struktur einer traditionellen Golddruckfarbe. Die Reflektion und damit Brillanz ist beeinträc[htigt] durch nur kleine Metallpigmente, die auc[h] noch in Bindemittel eingehüllt sind.

Struktur einer Bronzierung. Die nach wie vor beste Goldwirkung ist zu erklären durch die relativ großen und flach aufliegenden Metallp[ig]mente. Sie lassen eine gute Reflektion des einfallenden Lichtes zu.

Struktur des „Busche-Gold". Auch hier sind deutlich die relativ großen und flach aufliegen[den] Metallpigmente zu sehen, die eine Goldwirkung ermöglichen, fast wie bei einer Bronzierung.

Maschine zu tun, da sie zwei Druckv[er]fahren praktiziert: den Offsetdruck f[ür] die Farben und den Hochdruck (Flexod[r]uck) für den Golddruck.

Der Vergleich mit einer aufwendig[en] Bronzierung ist deshalb statthaft, w[eil] das neue „Busche-Gold" qualitativ fa[st] an eine Puderbronzierung heranreich[t].

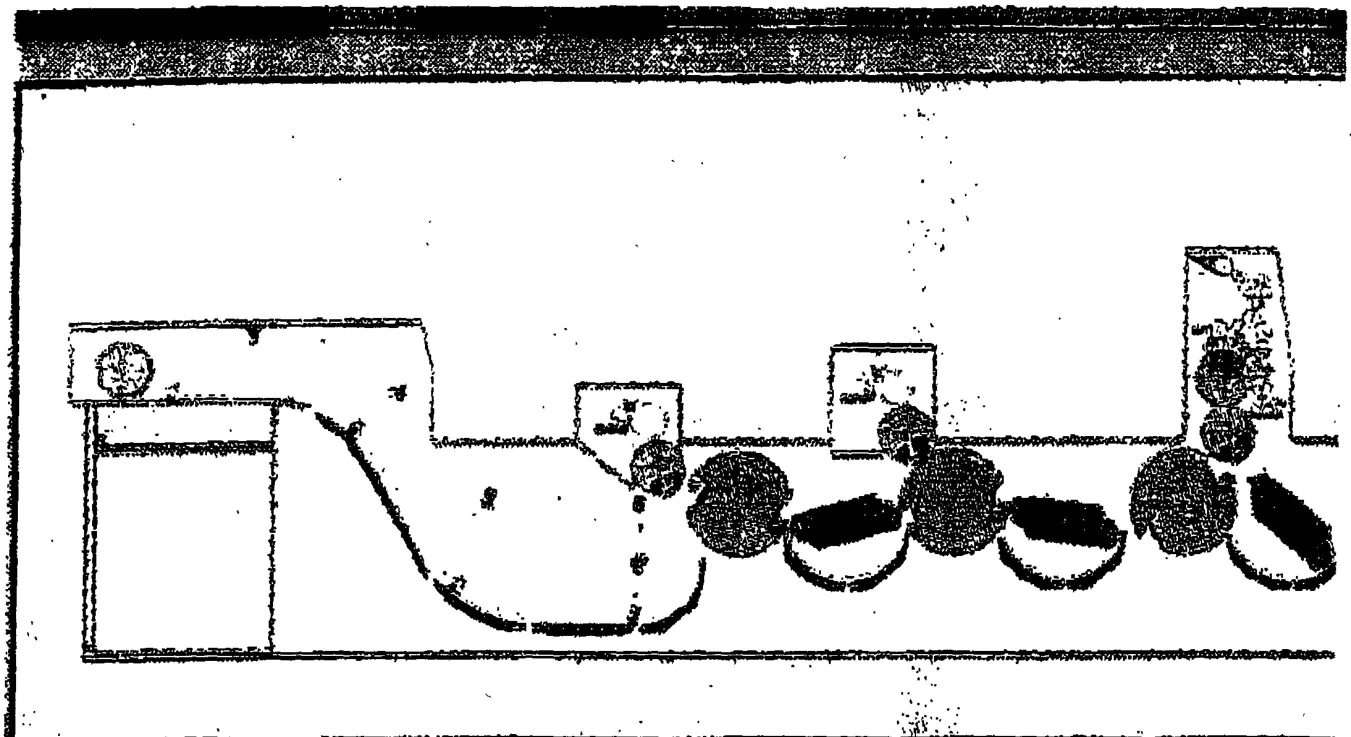
für (n) [illegible]

Aber die „alte" Bronziermethode ist wesentlich aufwendiger, denn wenn es um eine 5-farbige Arbeit mit Gold geht, braucht man neben einer Fünffarbenmaschine eine Bronziermaschine, einschließlich der Offsetmaschine für die Übertragung der Gold-Unterdruckfarbe, und schließlich dann auch noch einen weiteren separaten Durchgang für einen Lacküberdruck. Im übrigen, so Lange weiter, sei die Produktionsgeschwindigkeit beim Bronzieren im Verhältnis zur Inline-Fertigung nach dem Busche-Konzept sehr langsam. Dies würde die Durchlaufzeit eines Auftrags verlängern und die Personalkosten erhöhen. Dabei besteht im Rahmen der EG-Richtlinien mehr und mehr die Forderung nach schwermetallarmen Metalleffekten, und damit seien Gold- und Silberlacke auf wässriger Basis, wie sie beim „Busche-Gold" eingesetzt werden, ökologisch günstiger.

Neue Impulse für den Offset

Die praktische Vorführung der goldenen Busche-Konzeption war beeindruckend und absolut überzeugend. Der Verfasser weiß, worüber er berichtet: denn er hat in der vergangenen Zeit selber bronziert und die Probleme praktisch kennengelernt. Dabei hat er dann auch in vielen Auflagen den qualitativen Niedergang mit den Golddruckfarben, die über das Farbwerk gedruckt wurden, mitgemacht. Sie glänzten zu wenig, sie neigten in Verbindung mit der notwendigen Wasserführung zum Emulgieren, und auch die Trockung ließ nicht selten manche Wünsche offen. Busche demonstrierte mit der Roland 705 nicht nur die Offsettechnologie der Zukunft, sondern – in Verbindung mit dem Flexo- und Lackmodul von MAN Roland – die goldene Zukunft". Kein Stauben von Bronzepulvern, kein Emulgieren oder Aufbauen, sondern eine hervorragende Goldwirkung mit Tiefdruckqualität in Verbindung mit sehr guter Haftung auf der Oberfläche des verwendeten Kartons, da ja nach ganz kurzer Zwischentrocknung auch noch ein Schlußlack auf wässriger Basis aufgedruckt wird.

Sicherlich werden in der Abstimmung zwischen Offsetdruck und Flexodruck, d.h. Abwicklung Offsetplatten und Flexodruckplatten (Cyrel), vielleicht in diesem oder jenem Fall noch Probleme zu lösen sein. Aber das ändert für den Verfasser als „gestandenen" Offsetfachmann nichts an dem Tatbestand, daß wieder Fachleute aus der Praxis dem Offsetdruck neue, starke Impulse gegeben haben, die sich vor allen Dingen für Busche auszahlen werden. Man ist dort tatsächlich eine goldene Nasenlänge voraus.



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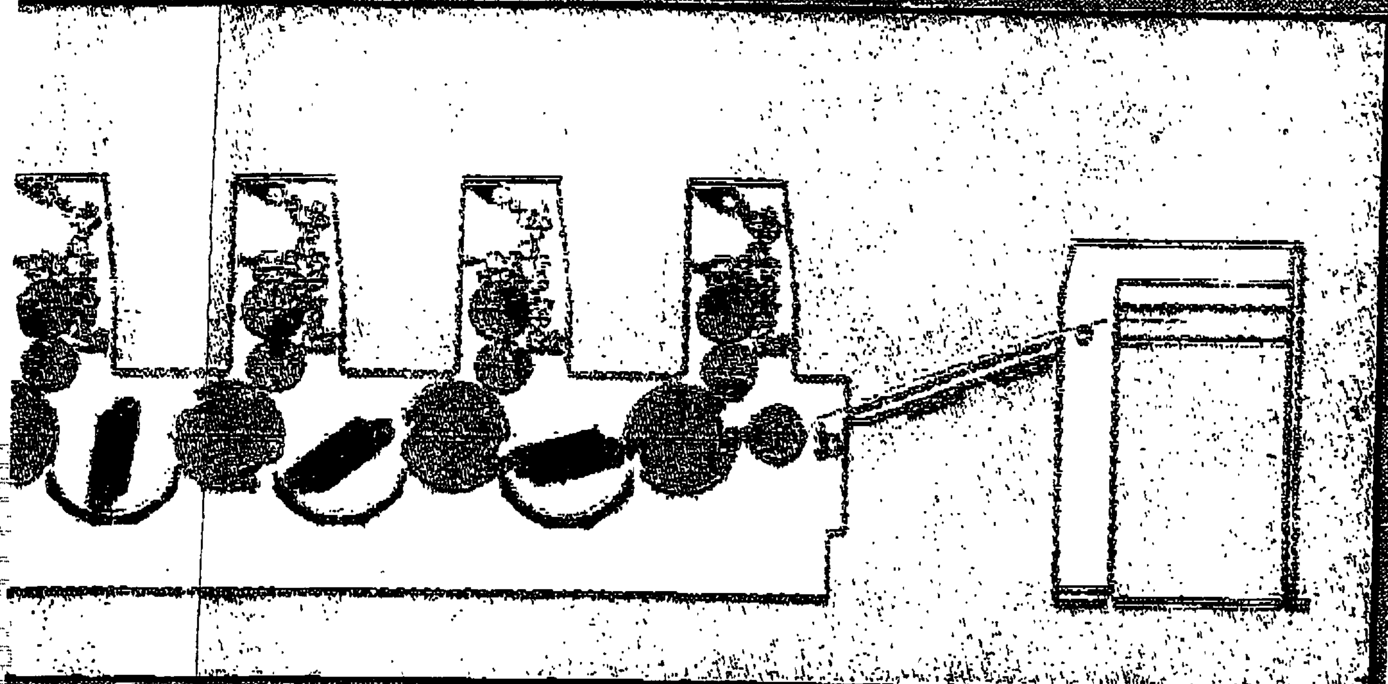

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K3

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by my office and revised by me, and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

'K3' = Excerpt from reference book "Flexodruck von A bis Z"

Ch. König

(Christian König)

FLEXO
PRINT

ERWIN SCHULZ

Erwin Schulz

FLEXOPRINT FROM A TO Z

Reference Book and Practical Guide

Fundamentals
Unit operations
Manufacturing facilities

Polygraph Publishers,
Frankfurt/M.

Design:
Hermann Rapp

Layout:
Hermann Fröhler

Production director:
Dieter Borniger

Overall production:
Fränkischer Tag GmnH & Co. KG, Bamberg

Paper:
Mediaprint satin, 115 g/m²
A Feldmühle AG product

ISBN 3-87641-239-0

Preface

For almost all fields of the graphic industry there is sufficient specialized literature. There is however, only a limited supply of literature covering the area of flexoprinting. On the other hand, the demand for information in this field is constantly growing, since this printing technique has undergone many changes and has seen many improvements over the past couple of years.

To meet this growing demand, Polygraph publishing house recently introduced the successful "Flexoprinting Training Book and Manual" by Erwin Schulz, which in the meantime has been translated into other languages as well. However, there was still the need for a convenient reference guide, a dictionary that can be consulted to quickly find the meaning of specialist terms, product descriptions, technical processes and procedures that are directly or indirectly connected with flexoprinting and cover the areas of jobbing, packaging, and newsprint.

This book is designed to fill that gap. It contains definitions -sometimes short, sometimes very detailed - of more than 1000 terms in an easily comprehensible and clear format. In addition, the user will find more than 500 illustrations and tables.

The book covers a wide variety of subjects, describing machines and materials for the manufacturing of printing forms, printing, print processing, as well as printing ink and print materials.

This is a reference guide that provides quick and easy access to a plethora of information, a book that will become an absolute must-have at the workplace.

We would like to take this as an opportunity to acknowledge the support of all companies who through their contributions of illustration material have made this book possible.

The symbol ▶ denotes a description under the respective entry.

The author

L

Labeling

Labeling is the additional tagging of oversized packaging material in the manufacturing of corrugated cardboard For that purpose the written information is printed onto regular Plexo slotters, while an attractive advertising label – manufactured for instance, in offset-technique - is glued onto the best side of the packaging box Alternatively, one box is used for two or several different units which are then labeled with an attractive get-up and a clear product statement using an additional label

A new type of labeling was developed for plastic bottles While until now labels were only applied upon completion of the bottling and sealing process- which still is the preferred method to date - a new procedure was introduced in the US and recently in Europe as well, according to which the labeling takes place during the manufacturing of the bottles, i e in the blowing mould This procedure is called In-Mould-Labeling (IML) It requires additional devices that insert the label at the prescribed spot into the blowing mould, without interrupting the manufacturing process Alternatively, the back side of the labels have to be coated with a substance that will- due to the still hot plastic- melt in the blowing mould, turn sticky, and eventually will bond with the plastic material. The lacquer will be applied in offset technique or filled into glue smearing machines, for which it needs to be heated to *(illegible)* °, Required coating amount min 4 to 6 g/m³ firm

Advantages of IML labeling

Cost reduction through reduced number of insertion weights during the manufacturing of moulds;

Cost reduction through the optimization of decoration expenses.

Faster filling techniques.

In the US, already 80 % of all plastic bottles currently on the market are decorated using the IML technique

Source "Der Fadenzähler" (illeg), Druckfabrik, Gebr Schmidt, Frankfurt/M

Lacquer

A comprehensive term for a variety of coatings based on organic binding agents Depending on the area of application, ▶ binding agents are dissolved in ▶ solvents or in water, or refined by adding ▶fillers or other ▶ additives, for instance waxes, and are applied to improve technological characteristics, such as ▶luster, ▶chafing and abrasion resistance, ▶hygrostability, amongst others

The lacquer can be applied with special coating machines, ▶ offline, or ▶ inline, in printing units (offset, intaglio, flexographic printing)

Fast lacquers

Definition a lacquer is "fast" if the application of lacquer does not cause a bleeding of the preprinted color The coating can be completed in a separate process, either after the printing or inline, i e. in the printing machine. In this case, any bleeding will show on the print itself, or through staining of the lacquer

Testing method and evaluation· a printed sample – coating print, if possible- is dipped into the respective lacquer After a set time and at a set temperature the lacquer is tested for staining

In addition, we recommend to perform the ▶ Solvent Fastness·Test according to DIN 16524, sheet 1 " Testing of Prints and Printing Color in the Graphic Trade"

The same testing method can be applied to determine suitability for calendaring

Lacquer application - Coating

Application of lacquer to improve the ▶luster or the ▶ abrasion resistance etc., either as resin- solution or as ▶ dispersion in coating machines, intaglio, flexographic printing units or offset machines

Once the lacquer has formed a dry, solid layer, it is referred to as a coating film

The following method can be used to determine the amount of applied coating

Unlaminated and uncoated aluminum foil is guided through the coating station, either as separate sheets, or glued to the material to be coated The ▶ weight per unit area can then be determined by weighing a defined area of the coated foil, and comparing its weight to the weight of the foil that has not been coated

Lacquer Lamination

For this technique, lacquer raw materials (resins or plastics) are disolved in organic ▶ solvents and applied as adhesive onto one of the materials Upon evaporation of the solvents the lacquer coat becomes sticky, and once the second sheet is added through pressing and subsequent passage through the drying channel a bond is achieved It is of utmost importance (especially for the packaging of food stuffs) that the solvents are completely removed, which will prevent the development of unpleasant odors caused by residual solvents

This procedure allows also for the connection of non-permeable, non-porous materials – that is foils (not applicable for the ▶adhesive lamination)

In general, different-based adhesives will be applied according to their respective uses

1. Adhesives solved in alcohol, or dilutable adhesives which remain thermoplastic upon evaporation of the solvents.
2. Reactive one-component adhesives The OH-groups of the foil's surface humidity and the atmosphere react with the NCO groups of the isocyanates, forming urethanes
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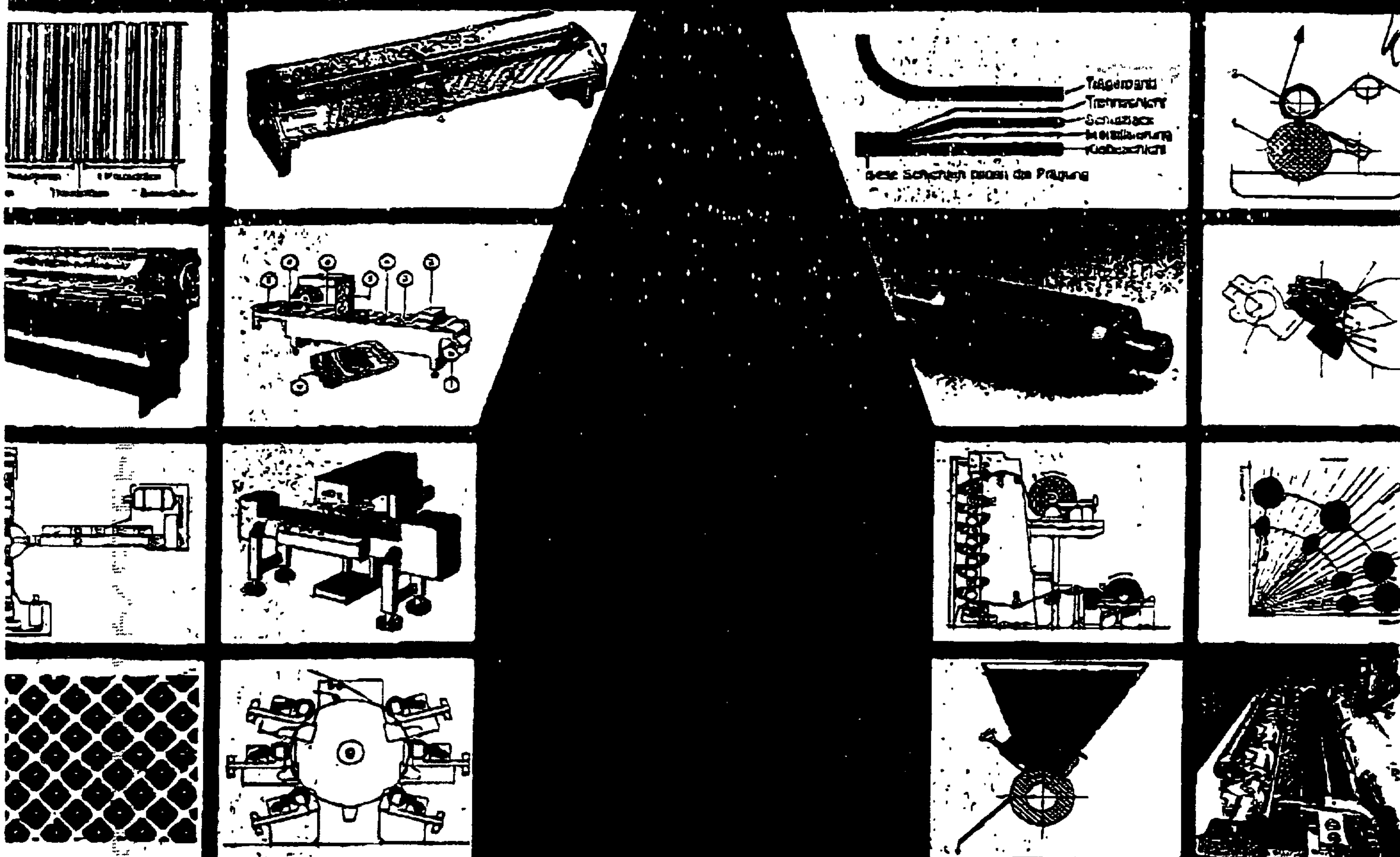
"Noise is a disturbing sound" is a short, but rather concise definition The difficulty of an exact denotation becomes apparent when we realize that we refer to something as "noise" if the physical fact "sound" has psychological implications and is perceived as a "disturbance", or if it has physiological implications, in which case it is considered as "damaging" We experience noise wherever we are· in the streets, on the rails, at the workplace, in large plants, offices, etc According to its definition, noise has a disturbing or damaging effect The degree of the disturbance depends on the type of sound On one hand, high frequencies and high volume, for instance, are felt as more disturbing as lower frequencies and volumes, while on the other hand (Translator's note Page is cut off)

FLEXO DRUCK



ERWIN SCHULZ

W018638

Erwin Schulz

FLEXODRUCK VON A BIS Z

Nachschlagewerk und praktischer Ratgeber

Grundlagen
Verfahrenstechniken
Produktionsmittel

Polygraph Verlag · Frankfurt am Main

[redacted]

Gestaltungskonzeption
Hermann Rapp

Layout
Hermann Fröhler

Herstellungsleitung
Dieter Borniger

Gesamtherstellung
Fränkischer Tag GmbH & Co. KG, Bamberg

Papier
Mediaprint seidenmatt, 115 g/qm,
ein Erzeugnis der Feldmühle AG.

ISBN 3-87641-239-0

Vorwort

Es gibt für fast alle Zweige der grafischen Industrie ein ausreichendes Angebot an Fachliteratur. Speziell für den Flexodruck ist die Auswahl jedoch nicht groß. Dagegen wächst der Bedarf an Information, da dieses Druckverfahren in den letzten Jahren enorme Entwicklungen und Verbesserungen erfahren hat.
Um hier Abhilfe zu schaffen, wurde im Polygraph Verlag bereits das erfolgreiche und inzwischen in andere Sprachen übersetzte ›Lehr- und Handbuch Flexodruck‹ von Erwin Schulz herausgebracht. Was bis jetzt immer noch gefehlt hat, ist ein Nachschlagewerk zur schnellen Information über Fachausdrücke beziehungsweise Produktbezeichnungen, technische Vorgänge und Verfahren, die direkt oder indirekt mit dem Flexodruck in den Bereichen Akzidenz, Verpackung und Zeitung zusammenhängen.
Diese Lücke soll das vorliegende Buch ausfüllen. Über 1000 Stichwörter sind teils kurz – viele aber auch sehr ausführlich – leicht verständlich und übersichtlich beschrieben. Als Ergänzung dazu dienen mehr als 500 Abbildungen und tabellarische Übersichten.

Die thematische Spannbreite des Werkes umfaßt die Maschinen und Materialien für die Druckformherstellung, den Druck, die Druckverarbeitung sowie Druckfarbe und Bedruckstoff.
Es ist ein Handbuch für den schnellen und bequemen Zugriff mit viel Information, das an keinem Arbeitsplatz fehlen sollte.
Allen Firmen und Institutionen, die durch Bildbeiträge zum Gelingen dieses Buches beigetragen haben, sei an dieser Stelle recht herzlich gedankt.

Das Zeichen ▷ bedeutet Hinweis auf Beschreibung unter diesem Stichwort.

Der Verfasser

W018640

[redacted]

L

abeln

ird bei der Wellpappen-Herstellung das isätzliche Etikettieren von Großverackungen genannt. Dazu wird auf normalen Flexo-Slottern die Schriftinformation druckt und auf der ›Schokoladenseite‹ n besonders werbewirksames Etikett aufklebt, das vorher zum Beispiel im Offsetruck hergestellt wurde. Oder man verendet eine Verpackung für zwei oder ehrere verschiedene Geräte und ›labelt‹ ese durch eine attraktive Ausstattung id klare Produktaussage mit einem zuzlichen Etikett (englisch heißt label = iken).

ir die Etikettierung von Kunststoffflahen wurde eine neue Form der Etikettieng entwickelt. Während bisher die Etiitten erst nach dem Füllen und Verschlieen aufgebracht wurden – und hauptsach-h auch noch werden –, hat man in den SA und nachher auch in Europa ein Verhren eingeführt, das die Etikettierung reits bei der Flaschenherstellung – also Blasform – vornimmt. Man nennt dieses rfahren In-Mould-Labeling (IML). Dazu üssen Zusatzgeräte zur Verfügung sten, die das Etikett ohne Störung des Proktionsablaufes passergenau in die Blasrm einlegen, oder die Etiketten müssen f der Rückseite eine Beschichtung aufeisen, die in der Blasform durch den noch ißen Kunststoff schmilzt, klebrig wird d sich mit dem Kunststoff verbindet. Der ck wird im Tiefdruck oder auf Lackierschinen aufgebracht; dazu muß er auf °C angewärmt werden; notwendige Aufgsmenge: mindestens 4 bis 5 g/m² fest.

rteile von IML-Etikettierung:

steneinsparung durch Reduzierung r Einsatzgewichte bei der Herstellung r Hohlkörper;

steneinsparung durch Optimierung - Dekorationskosten;

inellere Abfülltechniken.

den USA werden bereits 60 Prozent der dem Markt befindlichen Kunststofffla-ien nach der IML-Technik dekoriert.

llennachweis: ›Der Fadenzähler‹, 1984, Druckfarbfabrik, Gebr. Schmidt, Frankfurt am Main.

:k

ein Sammelbegriff für eine Vielzahl von chichtungsstoffen auf Basis organier Bindemittel. Je nach Einsatzgebiet werden ▷Bindemittel in ▷Lösemitteln oder Wasser gelöst, mit ▷Füllstoffen oder anderen ▷Additiven, zum Beispiel Wachsen, versehen und zur Verbesserung technologischer Eigenschaften, wie ▷Glanz, ▷Scheuer- und Abriebfestigkeit, ▷Wasserfestigkeit und anderes mehr aufgetragen. Der Auftrag kann auf speziellen Lackiermaschinen ▷offline oder aber in Druckwerken (Offset, Tiefdruck, Flexodruck) ▷inline erfolgen.

Lackierechtheit

Begriffsbestimmung: Eine Lackierechtheit ist dann gegeben, wenn durch einen Lackiervorgang kein Ausbluten der vorgedruckten Farbe eintritt. Die Lackierung kann in einem separaten Arbeitsgang anschließend an den Druckvorgang oder inline, das heißt in der Druckmaschine, erfolgen. Dabei wird sich das Ausbluten auf dem Druck selbst oder durch Anfärben des Lackes zeigen.

Prüfmethode und Beurteilung: Ein bedruckter Probestreifen – am besten vom Auflagendruck – wird in den entsprechenden Lack getaucht; nach vereinbarter Zeit und bestimmter Temperatur wird dann der Lack auf Anfärbung geprüft.

Es empfiehlt sich, auch die ▷Lösemittelechtheit nach DIN 16524 Blatt 1 ›Prüfung von Drucken und Druckfarbe des graphischen Gewerbes‹ zu prüfen.
Diese Prüfmethode kann man auch anwenden, wenn die Eignung für Kalandrieren festgestellt werden soll.

Lackieren – Lackierung

Auftragen des Lackes zur Verbesserung des ▷Glanzes oder als ▷Scheuerschutz und so weiter entweder als Harzlösung oder ▷Dispersion auf Lackiermaschinen, in Tiefdruck-, Flexodruckwerken oder Offsetmaschinen.
Hat der Lack nach der Trocknung eine zusammenhängende Schicht gebildet, so spricht man von einem Lackfilm.

Zur Bestimmung der Auftragsmenge kann folgendes Verfahren angewendet werden: Eine unlackierte und unkaschierte Aluminiumfolie wird entweder als Bogen separat oder auf der zu lackierenden Materialbahn aufgeklebt durch die Lackierstation geführt. Durch Auswiegen einer definierten Fläche der mit dem Lack versehenen Folie gegenüber einer unlackierten kann das ▷Flächengewicht ermittelt werden.

Lackkaschierung

Dazu werden Lackrohstoffe (Harze oder Kunststoffe) in organischen ▷Lösemitteln gelöst und als Haftmittel auf eine der Bahnen aufgetragen. Nach Verdunsten der Lösemittel wird der Lackfilm klebrig, so daß nach Zuführung der zweiten Bahn unter Anpressen und anschließendem Durchgang im Trockenkanal ein Verbund zustandekommt. Großer Wert (bei Lebensmittelverpackungen) ist auf die restlose Entfernung der Lösemittel zu legen, damit durch übergeführte Restlösemittel keine Geruchsschwierigkeiten auftreten können.
Mit diesem Verfahren können auch undurchlässige, nicht poröse Bahnen – also Folien – miteinander verbunden werden (im Gegensatz zur ▷Leimkaschierung).
In der Praxis werden je nach Anforderung Kleber auf unterschiedlicher Basis angewendet:

1. Alkoholgelöste beziehungsweise verdünnbare Klebstoffe, die nach dem Verdunsten der Lösemittel thermoplastisch bleiben.
2. Reaktive Einkomponentenklebstoffe; die OH-Gruppen der Oberflächenfeuchtigkeit von der Folie beziehungsweise aus der Atmosphäre reagieren mit den NCO-Gruppen der Isocyanate zu Urethanen.
3. Zweikomponentenklebstoffe; hochmolekulare Harze mit reaktiven Hydroxylgruppen werden mit isocyanathaltigem Härter zu Polyurethanen umgesetzt. Man erhält damit hochwertige Verbunde mit guten Echtheiten (▷Zweikomponenten-Systeme).
4. ▷High-Solids-Kleber mit einem Festkörpergehalt von 50 Prozent und mehr. Es sind also weniger Lösemittel zu verdampfen, dafür werden aber intensive und kostspielige Trockner benötigt.

▷Kaschieren

Lackmus

ist ein natürlicher Farbstoff aus einer Flechte. Damit werden saugfähige Papierstreifen eingefärbt (Lackmuspapier) als ▷Indikatoren zur Prüfung des ▷pH-Wertes. In saurer Lösung färbt sich Lackmus rot, in alkalischer dagegen blau.

Lärmschutz

›Lärm ist störender Schall‹, lautet eine kurze, aber sehr komplexe Definition. Die Schwierigkeit einer exakten Abgrenzung wird dadurch klar, daß man von Lärm spricht, wenn ein physikalischer Sachverhalt ›Schall‹ zu einem psychologischen Sachverhalt ›Störung‹ oder einem physiologischen Sachverhalt ›Schädigung‹ führt. Lärm entsteht überall, auf Straßen, Schienen, an den Arbeitsstellen, in Fabriksälen, Büros und so weiter. Er wirkt sich nach seiner Definition störend oder schädigend aus. Der Grad der Störung wird einerseits als Schallart bestimmt, zum Beispiel sind hohe Frequenzen und hohe Lautstärken störender als niedrige und andererseits

W018641

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This book is designed to fill that gap. It contains definitions -sometimes short, sometimes very detailed - of more than 1000 terms in an easily comprehensible and clear format. In addition, the user will find more than 500 illustrations and tables.

The book covers a wide variety of subjects, describing machines and materials for the manufacturing of printing forms, printing, print processing, as well as printing ink and print materials.
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Labeling

Labeling is the additional tagging of oversized packaging material in the manufacturing of corrugated cardboard For that purpose the written information is printed onto regular Flexo slotters while an attractive advertising label – manufactured for instance, in offset-technique - is glued onto the best side of the packaging box Alternatively, one box is used for two or several different units which are then labeled with an attractive get-up and a clear product statement using an additional label

A new type of labeling was developed for plastic bottles While until now labels were only applied upon completion of the bottling and sealing process- which still is the preferred method to date - a new procedure was introduced in the US and recently in Europe as well, according to which the labeling takes place during the manufacturing of the bottles, i e in the blowing mould This procedure is called In-Mould-Labeling (IML) It requires additional devices that insert the label at the prescribed spot into the blowing mould, without interrupting the manufacturing process Alternatively, the back side of the labels have to be coated with a substance that will- due to the still hot plastic- melt in the blowing mould, turn sticky, and eventually will bond with the plastic material The lacquer will be applied in offset technique or filled into glue-smearing machines, for which it needs to be heated to *(illegible)* °, Required coating amount min 4 to 6 g/m³ firm

Advantages of IML labeling

Cost reduction through reduced number of insertion weights during the manufacturing of moulds,

Cost reduction through the optimization of decoration expenses.

Faster filling techniques.

In the US, already 80 % of all plastic bottles currently on the market are decorated using the IML technique

Source "Der Fadenzähler" (illeg), Druckfabrik, Gebr Schmidt, Frankfurt/M

Lacquer

A comprehensive term for a variety of coatings based on organic binding agents

Depending on the area of application, ▶ binding agents are dissolved in ▶ solvents or in water, or refined by adding ▶fillers or other ▶ additives, for instance waxes, and are applied to improve technological characteristics, such as ▶luster, ▶chafing and abrasion resistance, ▶hygrostability, amongst others

The lacquer can be applied with special coating machines, ▶ offline, or ▶ inline, in printing units (offset, intaglio, flexographic printing)

Fast lacquers

Definition a lacquer is "fast" if the application of lacquer does not cause a bleeding of the preprinted color The coating can be completed in a separate process, either after the printing or inline, i e in the printing machine In this case, any bleeding will show on the print itself, or through staining of the lacquer

Testing method and evaluation a printed sample – coating print, if possible- is dipped into the respective lacquer After a set time and at a set temperature the lacquer is tested for staining

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Lacquer Lamination

For this technique, lacquer raw materials (resins or plastics) are disolved in organic ▶ solvents and applied as adhesive onto one of the materials

Upon evaporation of the solvents the lacquer coat becomes sticky, and once the second sheet is added through pressing and subsequent passage through the drying channel a bond is achieved It is of utmost importance (especially for the packaging of food stuffs) that the solvents are completely removed, which will prevent the development of unpleasant odors caused by residual solvents

This procedure allows also for the connection of non-permeable, non-porous materials – that is foils (not applicable for the ▶adhesive lamination)

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Preface

For almost all fields of the graphic industry there is sufficient specialized literature. There is however, only a limited supply of literature covering the area of flexoprinting. On the other hand, the demand for information in this field is constantly growing, since this printing technique has undergone many changes and has seen many improvements over the past couple of years.

To meet this growing demand, Polygraph publishing house recently introduced the successful "Flexoprinting Training Book and Manual" by Erwin Schulz, which in the meantime has been translated into other languages as well. However, there was still the need for a convenient reference guide, a dictionary that can be consulted to quickly find the meaning of specialist terms, product descriptions, technical processes and procedures that are directly or indirectly connected with flexoprinting and cover the areas of jobbing, packaging, and newsprint.
This book is designed to fill that gap. It contains definitions -sometimes short, sometimes very detailed - of more than 1000 terms in an easily comprehensible and clear format. In addition, the user will find more than 500 illustrations and tables.

The book covers a wide variety of subjects, describing machines and materials for the manufacturing of printing forms, printing, print processing, as well as printing ink and print materials.
This is a reference guide that provides quick and easy access to a plethora of information, a book that will become an absolute must-have at the workplace.
We would like to take this as an opportunity to acknowledge the support of all companies who through their contributions of illustration material have made this book possible.

The symbol ▶ denotes a description under the respective entry.

The author

L

Labeling

Labeling is the additional tagging of oversized packaging material in the manufacturing of corrugated cardboard For that purpose the written information is printed onto regular Plexo slotters, while an attractive advertising label – manufactured for instance, in offset-technique - is glued onto the best side of the packaging box Alternatively, one box is used for two or several different units which are then labeled with an attractive get-up and a clear product statement using an additional label

A new type of labeling was developed for plastic bottles While until now labels were only applied upon completion of the bottling and sealing process- which still is the preferred method to date - a new procedure was introduced in the US and recently in Europe as well, according to which the labeling takes place during the manufacturing of the bottles, i e in the blowing mould This procedure is called In-Mould-Labeling (IML) It requires additional devices that insert the label at the prescribed spot into the blowing mould, without interrupting the manufacturing process Alternatively, the back side of the labels have to be coated with a substance that will- due to the still hot plastic- melt in the blowing mould, turn sticky, and eventually will bond with the plastic material The lacquer will be applied in offset technique or filled into glue smearing machines, for which it needs to be heated to *(illegible)* °, Required coating amount min 4 to 6 g/m³ firm

Advantages of IML labeling

Cost reduction through reduced number of insertion weights during the manufacturing of moulds;

Cost reduction through the optimization of decoration expenses.

Faster filling techniques

In the US, already 80 % of all plastic bottles currently on the market are decorated using the IML technique

Source "Der Fadenzähler" (illeg), Druckfabrik, Gebr Schmidt, Frankfurt/M

Lacquer

A comprehensive term for a variety of coatings based on organic binding agents

Depending on the area of application, ▶ binding agents are dissolved in ▶ solvents or in water, or refined by adding ▶fillers or other ▶ additives, for instance waxes, and are applied to improve technological characteristics, such as ▶luster, ▶chafing and abrasion resistance, ▶hygrostability, amongst others

The lacquer can be applied with special coating machines, ▶ offline, or ▶ inline, in printing units (offset, intaglio, flexographic printing)

Fast lacquers

Definition a lacquer is "fast" if the application of lacquer does not cause a bleeding of the preprinted color The coating can be completed in a separate process, either after the printing or inline, i e in the printing machine In this case, any bleeding will show on the print itself, or through staining of the lacquer

Testing method and evaluation a printed sample – coating print, if possible- is dipped into the respective lacquer After a set time and at a set temperature the lacquer is tested for staining

In addition, we recommend to perform the ▶ Solvent Fastness Test according to DIN 16524, sheet 1 " Testing of Prints and Printing Color in the Graphic Trade"

The same testing method can be applied to determine suitability for calendaring

Lacquer application - Coating

Application of lacquer to improve the ▶luster or the ▶ abrasion resistance etc, either as resin- solution or as ▶ dispersion in coating machines, intaglio, flexographic printing units or offset machines.

Once the lacquer has formed a dry, solid layer, it is referred to as a coating film

The following method can be used to determine the amount of applied coating

Unlaminated and uncoated aluminum foil is guided through the coating station, either as separate sheets, or glued to the material to be coated The ▶ weight per unit area can then be determined by weighing a defined area of the coated foil, and comparing its weight to the weight of the foil that has not been coated.

Lacquer Lamination

For this technique, lacquer raw materials (resins or plastics) are disolved in organic ▶ solvents and applied as adhesive onto one of the materials

Upon evaporation of the solvents the lacquer coat becomes sticky, and once the second sheet is added through pressing and subsequent passage through the drying channel a bond is achieved It is of utmost importance (especially for the packaging of food stuffs) that the solvents are completely removed, which will prevent the development of unpleasant odors caused by residual solvents

This procedure allows also for the connection of non-permeable, non-porous materials – that is foils (not applicable for the ▶adhesive lamination)

In general, different-based adhesives will be applied according to their respective uses

1. Adhesives solved in alcohol, or dilutable adhesives which remain thermoplastic upon evaporation of the solvents
2. Reactive one-component adhesives The OH-groups of the foil's surface humidity and the atmosphere react with the NCO groups of the isocyanates, forming urethanes
3. Two-component adhesives resins of high molecular weight with reactive hydroxil groups are changed into polyurethanes by way of hardening agents containing isocyanate This results in high-grade, color fast compounds (▶ two component systems)
4. High-Solids adhesives featuring a solids content of more than 50% Consequently, a smaller amount of solvents needs to evaporate, but intensive and costly dryers are required
   ▶Lamination

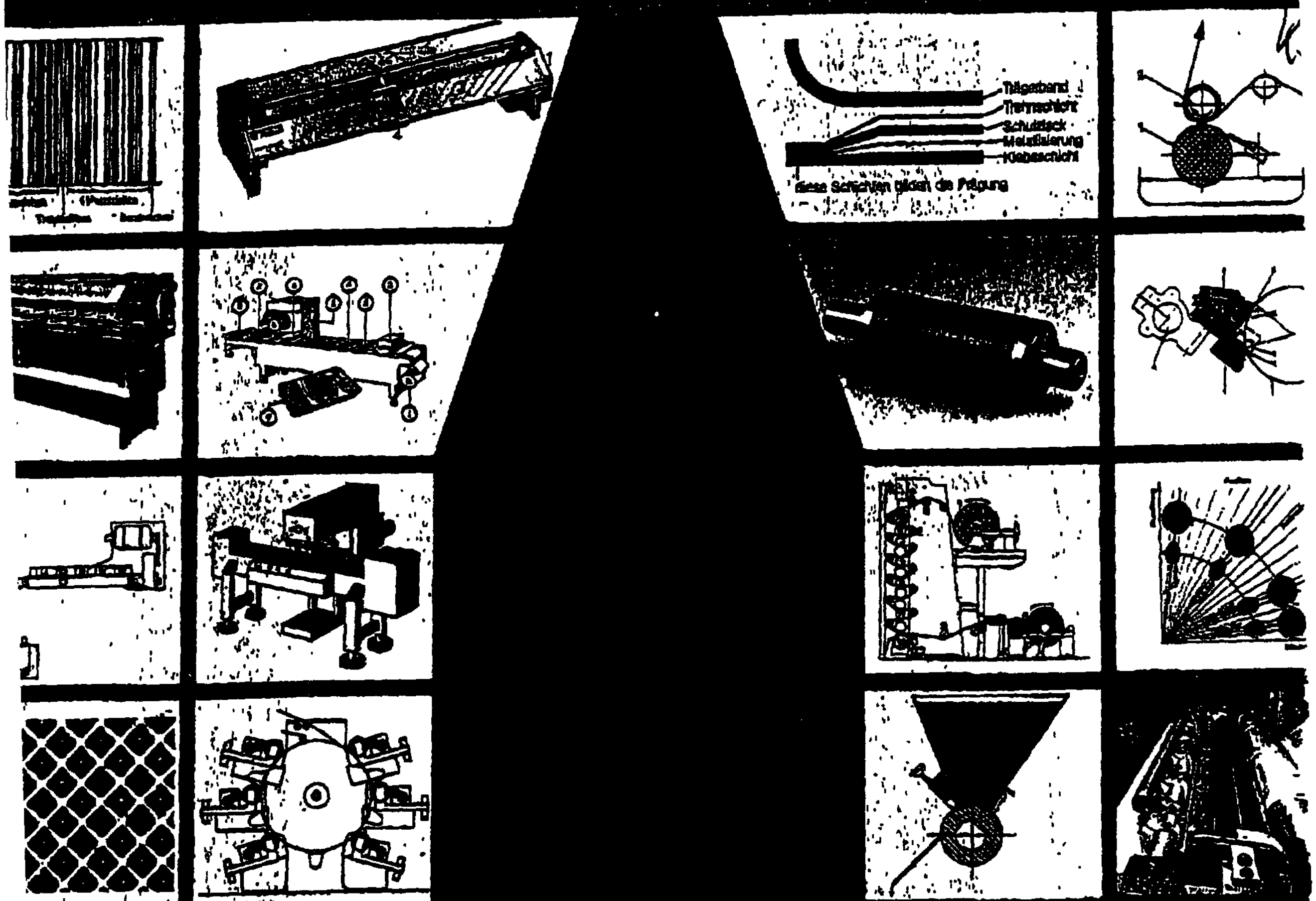
Litmus

is a natural colorant derived from lichen It is used to color absorbable paper strips (litmus paper), which serve as ▶indicators for the testing of the ▶ph value In an acidic solution, the litmus will show up as red, while the alkaline will appear blue

Noise protection

"Noise is a disturbing sound" is a short, but rather concise definition The difficulty of an exact denotation becomes apparent when we realize that we refer to something as "noise" if the physical fact "sound" has psychological implications and is perceived as a "disturbance", or if it has physiological implications, in which case it is considered as "damaging" We experience noise wherever we are in the streets, on the rails, at the workplace, in large plants, offices, etc According to its definition, noise has a disturbing or damaging effect The degree of the disturbance depends on the type of sound On one hand, high frequencies and high volume, for instance, are felt as more disturbing as lower frequencies and volumes, while on the other hand (Translator's note Page is cut off)

FLEXO-DRUCK



ERWIN SCHULZ

Erwin Schulz M 23.01.96

FLEXODRUCK VON A BIS Z

Nachschlagewerk und praktischer Ratgeber

Grundlagen
Verfahrenstechniken
Produktionsmittel

lygraph Verlag · Frankfurt am Main

[redacted]

[redacted]

Gestaltungskonzeption
Hermann Rapp

Layout
Hermann Fröhler

Herstellungsleitung
Dieter Borniger

Gesamtherstellung
Fränkischer Tag GmbH & Co. KG, Bamberg

Papier
Mediaprint seidenmatt, 115 g/qm,
ein Erzeugnis der Feldmühle AG.

ISBN 3-87641-239-0

Vorwort

Es gibt für fast alle Zweige der grafischen Industrie ein ausreichendes Angebot an Fachliteratur. Speziell für den Flexodruck ist die Auswahl jedoch nicht groß. Dagegen wächst der Bedarf an Information, da dieses Druckverfahren in den letzten Jahren enorme Entwicklungen und Verbesserungen erfahren hat.
Um hier Abhilfe zu schaffen, wurde im Polygraph Verlag bereits das erfolgreiche und inzwischen in andere Sprachen übersetzte ›Lehr- und Handbuch Flexodruck‹ von Erwin Schulz herausgebracht.
Was bis jetzt immer noch gefehlt hat, ist ein Nachschlagewerk zur schnellen Information über Fachausdrücke beziehungsweise Produktbezeichnungen, technische Vorgänge und Verfahren, die direkt oder indirekt mit dem Flexodruck in den Bereichen Akzidenz, Verpackung und Zeitung zusammenhängen.
Diese Lücke soll das vorliegende Buch ausfüllen. Über 1000 Stichwörter sind teils kurz – viele aber auch sehr ausführlich – leicht verständlich und übersichtlich beschrieben. Als Ergänzung dazu dienen mehr als 500 Abbildungen und tabellarische Übersichten.

Die thematische Spannbreite des Werkes umfaßt die Maschinen und Materialien für die Druckformherstellung, den Druck, die Druckverarbeitung sowie Druckfarbe und Bedruckstoff.
Es ist ein Handbuch für den schnellen und bequemen Zugriff mit viel Information, das an keinem Arbeitsplatz fehlen sollte.
Allen Firmen und Institutionen, die durch Bildbeiträge zum Gelingen dieses Buches beigetragen haben, sei an dieser Stelle recht herzlich gedankt.

Das Zeichen ▷ bedeutet Hinweis auf Beschreibung unter diesem Stichwort.

Der Verfasser

[redacted]

sein

bein

rd bei der Wellpappen-Herstellung das ätzliche Etikettieren von Großverkungen genannt. Dazu wird auf normal Flexo-Slottern die Schriftinformation druckt und auf der ›Schokoladenseite‹ besonders werbewirksames Etikett aufklebt, das vorher zum Beispiel im Offsetuck hergestellt wurde. Oder man verndet eine Verpackung für zwei oder hrere verschiedene Geräte und ›labelt‹ se durch eine attraktive Ausstattung d klare Produktaussage mit einem zulichen Etikett (englisch heißt label = kett).

r die Etikettierung von Kunststoffflaen wurde eine neue Form der Etikettieg entwickelt. Während bisher die Etiten erst nach dem Füllen und Verschlien aufgebracht wurden – und hauptsäch auch noch werden –, hat man in den A und nachher auch in Europa ein Verren eingeführt, das die Etikettierung eits bei der Flaschenherstellung – also Blasform – vornimmt. Man nennt dieses rfahren In-Mould-Labeling (IML). Dazu issen Zusatzgeräte zur Verfügung stea, die das Etikett ohne Störung des Proktionsablaufes passergenau in die Blasm einlegen, oder die Etiketten müssen der Rückseite eine Beschichtung aufisen, die in der Blasform durch den noch ßen Kunststoff schmilzt, klebrig wird d sich mit dem Kunststoff verbindet. Der k wird im Tiefdruck oder auf Lackierschinen aufgebracht; dazu muß er auf °C angewärmt werden; notwendige Aufgsmenge: mindestens 4 bis 6 g/m² fest.

rteile von IML-Etikettierung:
steneinsparung durch Reduzierung · Einsatzgewichte bei der Herstellung · Hohlkörper;
steneinsparung durch Optimierung · Dekorationskosten;
nellere Abfülltechniken.

den USA werden bereits 80 Prozent der dem Markt befindlichen Kunststoffflaen nach der IML-Technik dekoriert.

llennachweis: ›Der Fadenzähler‹, 1984, Druckfarfabrik, Gebr. Schmidt, Frankfurt am Main.

ck

ein Sammelbegriff für eine Vielzahl von chichtungsstoffen auf Basis organier Bindemittel. Je nach Einsatzgebiet werden ▷Bindemittel in ▷Lösemitteln oder Wasser gelöst, mit ▷Füllstoffen oder anderen ▷Additiven, zum Beispiel Wachsen, versehen und zur Verbesserung technologischer Eigenschaften, wie ▷Glanz, ▷Scheuer- und Abriebfestigkeit, ▷Wasserfestigkeit und anderes mehr aufgetragen. Der Auftrag kann auf speziellen Lackiermaschinen ▷offline oder aber in Druckwerken (Offset, Tiefdruck, Flexodruck) ▷inline erfolgen.

Lackierechtheit

Begriffsbestimmung: Eine Lackierechtheit ist dann gegeben, wenn durch einen Lackiervorgang kein Ausbluten der vorgedruckten Farbe eintritt. Die Lackierung kann in einem separaten Arbeitsgang anschließend an den Druckvorgang oder inline, das heißt in der Druckmaschine, erfolgen. Dabei wird sich das Ausbluten auf dem Druck selbst oder durch Anfärben des Lackes zeigen.

Prüfmethode und Beurteilung: Ein bedruckter Probestreifen – am besten vom Auflagendruck – wird in den entsprechenden Lack getaucht; nach vereinbarter Zeit und bestimmter Temperatur wird dann der Lack auf Anfärbung geprüft.

Es empfiehlt sich, auch die ▷Lösemittelechtheit nach DIN 16524 Blatt 1 ›Prüfung von Drucken und Druckfarbe des graphischen Gewerbes‹ zu prüfen.
Diese Prüfmethode kann man auch anwenden, wenn die Eignung für Kalandrieren festgestellt werden soll.

Lackieren – Lackierung

Auftragen des Lackes zur Verbesserung des ▷Glanzes oder als ▷Scheuerschutz und so weiter entweder als Harzlösung oder ▷Dispersion auf Lackiermaschinen, in Tiefdruck-, Flexodruckwerken oder Offsetmaschinen.
Hat der Lack nach der Trocknung eine zusammenhängende Schicht gebildet, so spricht man von einem Lackfilm.

Zur Bestimmung der Auftragsmenge kann folgendes Verfahren angewendet werden: Eine unlackierte und unkaschierte Aluminiumfolie wird entweder als Bogen separat oder auf der zu lackierenden Materialbahn aufgeklebt durch die Lackierstation geführt. Durch Auswiegen einer definierten Fläche der mit dem Lack versehenen Folie gegenüber einer unlackierten kann das ▷Flächengewicht ermittelt werden.

Lackkaschierung

Dazu werden Lackrohstoffe (Harze oder Kunststoffe) in organischen ▷Lösemitteln gelöst und als Haftmittel auf eine der Bahnen aufgetragen. Nach Verdunsten der Lösemittel wird der Lackfilm klebrig, so daß nach Zuführung der zweiten Bahn unter Anpressen und anschließendem Durchgang im Trockenkanal ein Verbund zustandekommt. Großer Wert (bei Lebensmittelverpackungen) ist auf die restlose Entfernung der Lösemittel zu legen, damit durch übergeführte Restlösemittel keine Geruchsschwierigkeiten auftreten können.

Mit diesem Verfahren können auch undurchlässige, nicht poröse Bahnen – also Folien – miteinander verbunden werden (im Gegensatz zur ▷Leimkaschierung).
In der Praxis werden je nach Anforderung Kleber auf unterschiedlicher Basis angewendet:

1. Alkoholgelöste beziehungsweise verdünnbare Klebstoffe, die nach dem Verdunsten der Lösemittel thermoplastisch bleiben.
2. Reaktive Einkomponentenklebstoffe; die OH-Gruppen der Oberflächenfeuchtigkeit von der Folie beziehungsweise aus der Atmosphäre reagieren mit den NCO-Gruppen der Isocyanate zu Urethanen.
3. Zweikomponentenklebstoffe; hochmolekulare Harze mit reaktiven Hydroxylgruppen werden mit isocyanathaltigem Härter zu Polyurethanen umgesetzt. Man erhält damit hochwertige Verbunde mit guten Echtheiten (▷Zweikomponenten-Systeme).
4. ▷High-Solids-Kleber mit einem Festkörpergehalt von 80 Prozent und mehr. Es sind also weniger Lösemittel zu verdampfen, dafür werden aber intensive und kostspielige Trockner benötigt.

▷Kaschieren

Lackmus

ist ein natürlicher Farbstoff aus einer Flechte. Damit werden saugfähige Papierstreifen eingefärbt (Lackmuspapier) als ▷Indikatoren zur Prüfung des ▷ph-Wertes. In saurer Lösung färbt sich Lackmus rot, in alkalischer dagegen blau.

Lärmschutz

›Lärm ist störender Schall‹, lautet eine kurze, aber sehr komplexe Definition. Die Schwierigkeit einer exakten Abgrenzung wird dadurch klar, daß man von Lärm spricht, wenn ein physikalischer Sachverhalt ›Schall‹ zu einem psychologischen Sachverhalt ›Störung‹ oder einem physiologischen Sachverhalt ›Schädigung‹ führt. Lärm entsteht überall, auf Straßen, Schienen, an den Arbeitsstellen, in Fabriksälen, Büros und so weiter. Er wirkt sich nach seiner Definition störend oder schädigend aus. Der Grad der Störung wird einerseits als Schallart bestimmt, zum Beispiel sind hohe Frequenzen und hohe Lautstärken störender als niedrige und andererseits

K4


Stellenmarkt, Maschinenanzeiger
11. März 1993
Druck Industrie
Köpfli & Partner

W018667

Editorial

DruckIndustrie

Zeitschrift für die grafische Branche der Schweiz
23. Jahrgang
Nr. 5, 11. März 1993

• Organ des Verbandes der Schweizer Druckindustrie (VSD) mit offiziellem Stellenanzeiger
• Mitteilungen des Grafischen Forums Zurich

Adresse:
DruckIndustrie
Fürstenlandstrasse 122
9001 St.Gallen

Tel. 071/29 77 77 (Zollikofer AG)

Direktwahlnummern
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Telefax 071/29 74 87

Redaktion:
Franz Wick, Rolf Wyss
VSD: Maurice Wicky

Sekretariat, Anzeigenverwaltung:
Imelda Sonderegger

Druck und Verlag
Zollikofer AG
Fürstenlandstrasse 122
9001 St Gallen

Jahres-Abonnementspreis:
Inland Fr. 80.–, Ausland Fr. 100.–
Einzelnummer Fr. 5.–

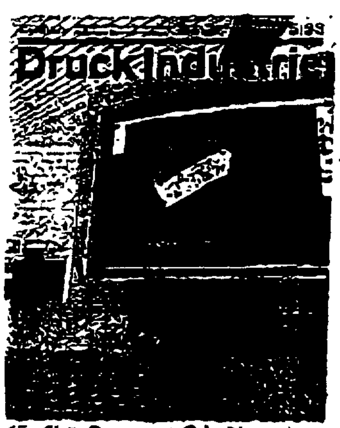
Inseratenpreis (Stellenanzeiger)
Einspaltige Millimeterzeile
Fr. 1.95, Spaltenbreite 44 mm

Erscheinungsweise:
Zweimal monatlich,
1. und 3. Woche

EURO GRAPHIC PRESS

DI ist einziges schweizerisches Mitglied von Eurographic Press

DruckIndustrie wird auf Biberist Sprint LWC NO Glänzend 80 gm² gedruckt.



Köpfli & Partner AG in Neuenhof bei Baden ist eine moderne Druckerei mit einer 24köpfigen Belegschaft. Das traditionsreiche Unternehmen konnte im Herbst 1991 einen Neubau beziehen und bei dieser Gelegenheit den Maschinenpark mit einer Fünffarben Speedmaster aufstocken.

Verwirrung

In Dortmund hatte MAN Roland zusammen mit der dort ansässigen Druckerei Busche zu einer grossangelegten Presseinformation eingeladen (Seite 22). Gezeigt wurde der Inline-Druck von Gold im Hochdruckverfahren, und dies im Anschluss an mehrfarbigen Offsetdruck. Damit entfällt das Offline-Bronzieren. Primär wird ein Rationalisierungseffekt erzielt. Mehr noch: Die neue Farbe soll keine oder weniger Metallpigmente enthalten. Ein willkommender Beitrag zum Umweltschutz.

So weit, so gut! Nur, was aus der «Chose» gemacht wurde, war eine Verwirrung. Da war sogar die Rede von einem völlig neuen Offsetverfahren und von Weltpremiere. Drucker, Maschinenbauer und Druckfarbenlieferanten – alle wollen die Nase vorne haben. Sollen sie!

Beim näheren Recherchieren wurde bald einmal klar, dass diese Weltpremiere einer Richtigstellung bedarf. Inline-Golddrucken können auch andere. Heidelberg beispielsweise hat auch Gold im Lackkasten. Wie weit es sich um Praxiserprobung oder um Laborversuche handelt, bleibe dahingestellt. Beispielsweise bei A. Hug & Co. AG in Arbon werden ebenfalls Bier-Etiketten mit Gold inline gedruckt. So allein an der Spitze ist man in Dortmund nicht!

Premiere ist insofern richtig, wenn es um die Druckmaschinenbauer aus Offenbach geht. Das Flaggschiff Roland 700 ist hier erstmals gleich mit zwei Lackmodulen gekoppelt. Das zweite Aggregat wird für einen Schutzlack eingesetzt. Maschine und Druckqualität machen einen bestechenden Eindruck. Besser kann man Gold wohl kaum drucken! Und neu ist schliesslich das Ganze für die Druckerei Busche, die zweifellos Pionierleistung für sich in Anspruch nehmen kann.

Warum die Sache so breitwalzen? Goldig inline drucken ja wohl die wenigsten. Das Thema hat symptomatischen Charakter. Innovation muss um jeden Preis her! Nur die Suche danach ist oft mühsam, das Gefundene selbst fragwürdig. Die Nase vorne hat man oft nur scheinbar. Aber es ist in jedem Fall gut, in diesem Glauben zu leben. Das gibt Selbstsicherheit! Neues aber lässt sich nicht mit dem Kopf durch die Wand erzwingen. Und zudem: Neues ist oft nicht Neues, oft Schnee von gestern. Der klare Kopf schützt vor Verwirrung.

Um Verwirrung geht es heute oft. Einmal mehr: Unsere Branche ist (auch) einer strukturellen Krise ausgesetzt. Mit überzeugenden Argumenten lassen sich Angriffe von aussen parieren. Karl Meyer & Co. AG in Allschwil hat zu einem Round-Table eingeladen, das primär aufzeigt, wie sehr und auch wie effizient man sich mit der Entsorgung befasst (Seite 13). Der Bund Schweizer Werbeagenturen (BSW) will eine Kampagne gegen Werbeverbote für Tabak und Alkohol lancieren und diese auch gleich selber berappen.

Sich den Herausforderungen stellen! Warum nicht öfter? Warum wehrt sich die Branche nicht öffentlich gegen Angriffe auf Bedrucktes? An Argumenten fehlt es nicht, etwa die 50 000 Arbeitsplätze der grafischen Industrie. Oder die Waldpflege der Papierindustrie. Oder die Werbung als Motor der Wirtschaft, ohne die nichts geht, usw.

Warum lässt man der Verwirrung um die Akzeptanz unserer Produkte in den Briefkasten soviel Spielraum? Warum nicht Klarheit statt Verwirrung?

Franz Wick

Inhaltsverzeichnis

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Nach Golde drängt, am Golde hängt doch alles...

Das Goethe-Zitat ist als Überschrift eines Berichts über eine Fachpresse-Tagung in Dortmund wohl angebracht. Denn um Gold, präziser gesagt: um den Golddruck schlechthin ging es. Dass dem Pionier eines neues Verfahrens auch noch eine Goldmedaille übergeben wurde, war ein sinnvoller Nebeneffekt dieser «goldenen Premiere». Als solche wurde der Anlass bei Busche in Dortmund bezeichnet. Erstmals in dieser Art soll hier Gold industriell im Inline-Verfahren mit einer Mehrfarben-Bogenoffsetmaschine zu Papier gebracht werden. Neu ist dabei die Art des Aufdrucks selbst. Er erfolgt nämlich mittels Hochdrucks und, noch präziser, mittels einer Kunststoffplatte. Ein neues Golddruckverfahren hat bei Busche in Dortmund seinen Anfang genommen.

Der Goldauftrag bisher

Gerade in Deutschlands grösster Bierbrauer-Stadt hat der Golddruck seine besondere Bedeutung. Die Flaschenetiketten müssen goldverziert sein. Aber auch Verpackungen und viele andere Drucksachen sind ohne Gold und Silber nicht vorstellbar. Die Funktion des Verkaufs einer Etikette oder einer Verpackung ist hinlänglich bekannt. Gold- und Silbereffekte auf Verpackungen und Etiketten sollen die besondere Wertigkeit der angebotenen Ware unterstreichen.

Das vordringliche Problem ist nicht der Golddruck, sondern vor allem das Entsorgen des Goldes. Gold- und Silberfarben enthalten Metallpigmente wie Aluminium und Blei. Der Umweltschutz ist auf den Plan gerufen! Die Druckindustrie ist zu innovativem Denken und Handeln aufgefordert.

Wer bisher von Golddruck sprach, dachte an Bogentiefdruck und an Bronzieren auf einer separaten Offsetmaschine. Mit diesen beiden Verfahren ist es möglich, den Goldauftrag in der notwendigen Auftragsmenge auf den Druckträger zu bringen. Tiefdruck und Bronzieren sind aufwendig und teuer. In beiden Fällen handelt es sich um einen separaten Arbeitsprozess. Dazu kommt der bereits erwähnte umweltbelastende Aspekt der Farben.

Zum Vergolden zählt auch der Prägefoliendruck, der wohl als höchste Stufe der Veredelung bezeichnet werden kann. Aus verständlichen Gründen ist dieses Verfahren exklusiv und wird es wohl auch bleiben.

Schliesslich kann Gold im normalen Offsetverfahren gedruckt werden. Aus qualitativen Gründen befriedigt diese Variante kaum. Die Auftragsmenge ist zu gering.

...rtin Lange, Vorstandsmitglied MAN Roland, erklärt das «corpus delicti». Durch die ...male Glasscheibe wird das Innenleben des Lackmoduls ein wenig ersichtlich.

Drei Jahre Entwicklungsarbeit

Bei Busche in Dortmund hat man sich des Golddrucks angenommen. Vater der beachtenswerten Entwicklung ist Klaus Rietzler, Leiter der Abteilung Verfahrenstechnologie. Auf seine Initiative gehen die ersten Pläne zurück, das herkömmliche arbeits- und kostenintensive Bronzieren beim Offsetverfahren durch eine im Effekt vergleichbare, zusammen mit dem Farbdruck ablaufende Inline-Fertigung zu ersetzen.

Nach der Idee die Ausführung. Beteiligt daran waren die Münchner Druckfarbenfabrik Michael Huber GmbH (die Mutterfirma von Stehlin + Hostag AG in Lachen), Du Pont de Nemours als Plattenhersteller und MAN Roland als Druckmaschinenbauer. Ziemlich genau drei Jahre hatte die Entwicklung gedauert, ehe man damit an die Öffentlichkeit gelangen konnte. Eine beeindruckende Demonstration lässt den Schluss zu: Die Sache ist praxisreif!

Um eine Nasenlänge voraus

Das neue Golddruckverfahren sei jetzt jedermann zugänglich, wurde in Dortmund gesagt. Diese generöse Aussage lässt aber Zweifel zu. Vom Busche-Vortragstisch aus wurde denn auch mit aller Deutlichkeit betont, dass man trotz Freigabe um eine Nasenlänge vorausbleiben wolle. Worin besteht diese Nasenlänge?

Dazu vorerst ein kurzer Systembeschrieb: An eine Fünffarben Roland 700 sind gleich zwei Türme (Module) angebaut. Der Goldauftrag erfolgt im ersten Turm, und zwar ab einer Cyrel-Platte von Du Pont. Sie wird mit «0,63» bezeichnet und verfügt über einen weichelastischen Unterbau. Damit haben wir es also mit einem Hochdruckverfahren zu tun. Präziser gesagt, handelt es sich um Flexodruck mit wasserlöslicher Farbe. Es sei eine Offsetgoldfarbe, deren Grundlage wässrige Bindemittel seien, wurde gesagt. Offset- oder Flexofarbe? Die Frage soll vor allem den Farbenhersteller beschäftigen.

Uns interessiert die Nasenlänge. Worin besteht das Geheimnis? Wohl doch sicher darin, wie Offsetdruck und Hochdruck passermässig kombiniert werden können. Da ist zweifellos ein reprotechnischer Kniff dabei, und diese

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...e will man nicht auf den Tisch le-... Es müsse sehr präzise gearbeitet ...den, wurde umständlich erklärt. ...in Wort davon, worin denn diese Pra-...ion eigentlich besteht. Bei Busche ...ill man verständlicherweise um eine Nasenlänge vorne bleiben, den Vorsprung nicht so schnell preisgeben. Schliesslich hat man ja auch einiges an Zeit und Geld in die Entwicklung investiert.

Das zweite Modul darf nicht vergessen werden: Es hat nichts Geheimnisvolles mehr an sich. Es ist ein Lackwerk, wie es heute überall vorkommt. Dispersionslack, der zum Glanz und zur Scheuerfestigkeit des Druckgutes beiträgt. Bei Busche werden die vergoldeten Bogen mit einem Überdrucklack versehen.

Premiere bei Busche in Dortmund: Erstmals wurden an eine Fünffarben Roland 700 zwei Lackmodule angekoppelt. Der Golddruck erfolgt im ersten Modul im Hochdruckverfahren, das zweite Modul wird für einen Überdrucklack eingesetzt.

Zum Patent angemeldet

Dass man Leimölbindemittel weglässt und dafür wässrige Bindemittel einsetzt, ist der ökologische Aspekt der Entwicklung. Dafür ist vor allem die Druckfarbenfabrik Michael Huber München GmbH zuständig. Als Acrylac werden die neuen Gold- und Silberdruckfarben bezeichnet. Die Entwicklung ist seit 1991 zum Patent angemeldet, wobei der Patentschutz sowohl die Herstellungsmaterialien als auch das Herstellungsverfahren selbst umfassen soll.

Die Fachpressekonferenz in Dortmund war eine gute Lektion, die Wissenswertes über Gold- und Silberfarben vermittelte, z.B.:

Je gröber die Teilchen, desto weiter ragen diese aus dem Druckfarbenfilm heraus. Die herausragenden Metallflächen können Licht reflektieren, was zu einem Eindruck von metallischem Glanz führt.

Je glatter die Struktur der herausragenden Teilchen ist, desto grösser ist wiederum der Metalleffekt. An einer unebenen Oberfläche dagegen wird die Reflexion des Lichtes, also der Glanz, durch diffuse Streuung gebrochen.

Durch Auswahl geeigneter Teilchengrössen kann das optimale Verhältnis zwischen Metalleffekt und Ausdruckverhalten/Deckkraft hergestellt werden.

Gegenüber dem Offsetbindemittel ermöglicht das wässrige Bindemittel ein günstigeres Schwimmverhalten der Metallpigmente auf der Oberfläche. Die Pigmente können sich planparallel zur Oberfläche ausrichten.

Aufgrund geringer Farbspaltung bei einem direkt arbeitenden Lackaggregat kann deutlich mehr Farbe übertragen werden. Dadurch können die Metallpigmente grösser gewählt werden, was insgesamt zu einem deutlich besseren Metalleffekt führt.

Zusammengefasst können folgende Besonderheiten von Acrylac Gold festgehalten werden:

- Inline-Fertigung an der Offsetmaschine
- Umweltverträglichkeit, da wasserbasiert und auch schwermetallfrei
- geruchsarm
- grosser Einsatzbereich (Kartonagen, Etiketten)
- Goldeffekt wie beim Tiefdruck

Roland 700 in bester Präsentation

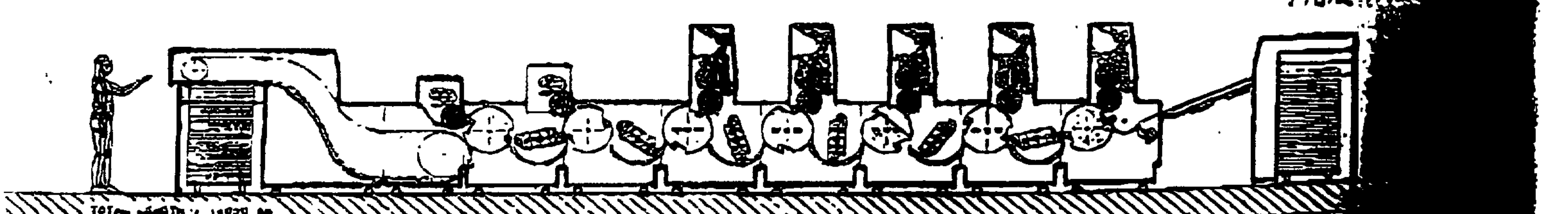
Die «Besichtigung» des neuen Golddruckverfahrens ist wenig ergiebig. Das «Geheimnis» soll durch eine schmale Scheibe auf dem Lackmodul ersichtlich sein. Viel ist da nicht zu sehen! Interessant ist zu hören, dass man demnächst Versuche mit einer Rasterwalze machen will. Also ist die Erprobung noch nicht zu Ende. Kurzfarbwerk für den Golddruck?

Die Maschine läuft mit 12 000 Bogen pro Stunde. Inline-Golddruck nach dem Fünffarben-Offsetdruck und zum Schluss der Überdrucklack.

Fast mehr als das eigentliche Gold vermag die Roland 700 zu faszinieren. Die Maschine scheint jetzt alle Kinderkrankheiten hinter sich zu haben. 1990 wurde sie erstmals an der Drupa präsentiert. Bei Farbendruck Weber in Biel und bei Limmatdruck in Spreitenbach erfolgen in Kürze die ersten Schweizer Installationen. 150 Druckwerke sollen jüngst nach Japan verkauft worden sein.

Doch das ist hier nicht das Thema. Wichtig ist die Feststellung, dass mit dieser Maschine bei Busche der Inline-Golddruck mehr und mehr ökonomische Bedeutung erlangt. Der Golddruck ist vor allem auch schneller und rentabler geworden. Inline-Finishing ist eine Stufe weiterentwickelt. Auf Kosten welcher Verfahren und welcher Unternehmen? Das herkömmliche Bronzieren in separatem Druckgang wird wohl früher oder später der Vergangenheit angehören. Und der Golddruck im Bogentiefdruck, der ja auch aus Offenbach angeboten wird? Man wolle daran festhalten, wurde gesagt. Aber so überzeugend tönte das nicht. Die Zukunft des Golddrucks wird viel eher im Verfahren à la Busche liegen.

Franz Wic...



...hema der Roland 700 mit den beiden Lackmodulen

«Druckindustrie» 9001 St.Gallen, Nr.5, 11.3.1993

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(Christian König)

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No 5 March 11,1993

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Annual subscription price:
Switzerland Fr.80.00, Abroad Fr 100 00
Individual issues: Fr.5.00

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Precision is of utmost importance, we were told, but details about the nature of this precision were not provided. Of course, Busche wants to stay ahead of the curve and does not want to give up its competitive position We must not forget that they invested a lot of time and money into this project

Let's not forget the second module: no secrets there. This is a common coating unit Dispersion coatings, which improve both luster and abrasion resistance of the printed item. Busche coats the gilded sheets with an overprint coating.

Patent pending

The ecological advantage is the omission of linseed oil binding agents and their replacement by aqueous binding agents This is mainly the responsibility of the Farbenfabrik Michael Huber München GmbH The innovative gold-and silver inks are called Acrylac. A patent is pending since 1991, and the patent will cover the ingredients as well as the manufacturing process.

The professional press conference in Dortmund provided useful information on the gold and silver inks, for instance:

The coarser the particles, the further they protrude from the printed film. The protruding particles can reflect the light, leading to a metallic luster effect

The smoother the structure, the better the metallic effect. A rough surface, on the other hand, would break the light reflection, i.e. the luster, by diffuse scattering.

The selection of appropriate particle sizes can lead to the perfect ratio between metallic luster and printing characteristics/covering strength.

Compared to offset binding agents, the aqueous binding agent enables a more favorable flooding of the metal pigments on the surface. The pigments are able to achieve a configuration that is plane-parallel to the surface

Due to the reduced ink separation of a directly acting coating aggregate, significantly larger amounts of ink can be transferred. Consequently, the size of the individual metal pigments may be larger, resulting in a clearly more impressive metal effect overall

In conclusion, Acrylac Gold has the following special features,

- Inline production at the offset machine
- Environmentally friendly, since water-based and free of heavy metals
- Almost odorless
- Large area of application (packaging, labels)
- Gold effect as in intaglio printing.

Roland 700 – Very attractively presented

The "inspection" of the innovative gold print procedure turned out to be not very productive. The "secret" supposedly can be seen through a narrow screen on the coating module Yet, there is not much to be seen! It was interesting to hear that trials using an anilox roller are planned for the near future - meaning, the testing phase is not yet completed. A short inking unit for gold print?

Photo caption:
Premiere at Busche's in Dortmund: for the first time ever, two coating modules were coupled to a Fünffarben Roland 700 The gold printing takes place in the first module using the relief printing technique, while the second module is used for overprint coating.
Illustration Model of the Roland 700 including both coating modules

The machine is processing 12,000 sheets per hour. Inline-gold printing following the five-color offset printing, followed by overprint coating.

The Roland 700 is actually even more fascinating than the gold By now, this machine seems to be free of bugs In 1990, it was presented at the Drupa for the first time Farbendruck Weber in Biel and Limmatdruck in Spreitenbach will shortly commence with the first installations in Switzerland. Apparently, 150 printing units were recently sold to Japan.

This however, is beside the point More important is the fact that because of this machine, the economic importance of inline gold printing increases for Busche. The entire gold printing process has become faster and more profitable. Inline finishing has progressed to a new level. But at the expense of which procedures and which companies? The traditional bronzing performed in a separate printing stage will sooner or later be a thing of the past And what about the gold printing with in sheet-fed intaglio printing, a technique also offered in Offenbach? They say that they want to keep supporting it - but it did not sound all that convincing. The future of gold printing will most certainly be found in techniques such as presented by Busche.

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But why the exaggeration? There are only a few who print gold inline. The subject seems to be symptomatic. Innovation, no matter what! The search for innovation becomes tiresome, while the innovation itself is dubious in more than one case. Being ahead of the curve- occasionally, it only seems that we really are. But in any case, it is always good to believe that we are ahead of the curve. After all, it boosts our confidence! However, innovations simply cannot be forced. Besides: Quite often, supposedly new things are really yesterday's news. Keeping a clear head prevents us from getting confused.

And today, we are often confused. To repeat: our field is facing (amongst others) a structural crisis. Attacks from outsiders can be deflected with convincing arguments. Karl Meyer & Co. AG in Allschwil, for instance, invited to a round table talk- a forum that clearly showed the intensive interest in and effective handling of waste disposal issues (page 13). The Association of Swiss Advertising Agencies (BSW) intends to launch and fund a campaign for the prohibition of advertising for tobacco and alcohol products.

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Gold printing has special meaning for Germany's largest city of brewers. The bottle labels just have to have a golden trimming. Packaging and many other printed materials are simply inconceivable without gold or silver decorations. The importance and function of labels and packaging for sales are well known. Gold- and silver effects are supposed to enhance the special value of the goods offered.

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The coarser the particles, the further they protrude from the printed film. The protruding particles can reflect the light, leading to a metallic luster effect.

The smoother the structure, the better the metallic effect. A rough surface, on the other hand, would break the light reflection, i.e. the luster, by diffuse scattering.

The selection of appropriate particle sizes can lead to the perfect ratio between metallic luster and printing characteristics/covering strength.

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by my office and revised by me, and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

"K4" = "*Druckindustrie*" 9001 ST. Gallen, No. 5, Mar. 11th 1993, "*Nach Golde drängt, am Golde hängt doch alles ...* "

Ch. König

(Christian König)

DruckIndustrie

Köpfli & Partner

DruckIndustrie:
Magazine for the Graphic Industry of Switzerland
Volume 23.
No.5 March 11,1993

- Organ of the Association of the Swiss Printing Industry (VSD), including the official employment gazette
- Information of the Graphic Forum, Zürich

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Print and publishing:
Zollikofer AG
Fürstenlandstrasse 122
9001 St. Gallen

Annual subscription price.
Switzerland Fr.80 00, Abroad Fr.100.00
Individual issues: Fr.5.00

Advertisement rates (employment section)
One column mm line
Fr. 1 95, column width 44 mm

Published:
Twice per month
Week 1 and 3.

DI is the sole Swiss member of Eurographic Press

DruckIndustrie is printed on Biberist Sprint LWC NO Glossy 80 gm²

DRUCKINDUSTRIE
Köpfli & Partner AG in Neuenhof near Boden is a modern printing facility with 24 employees. In the fall of 1991, the traditional company was able to move into a new building and added a Five-Color Speedmaster to its equipment.

Confusion

In Dortmund, MAN Roland and the local Druckerei Busche had invited to a large-scale media information event (page 22) They demonstrated the inline-printing of gold using a relief process, subsequent to multi-colored offset printing. This abolishes the need for offline-bronzing. But wait, there is more: the new color supposedly does not contain any, or at least less metal pigments A welcome contribution to the protection of our environment

Fair enough But what they made out of this "affair" was quite confusing, indeed. They even started talking about a completely innovative offset process and a world premiere. Printer, mechanical engineers, suppliers of printing ink – everyone wants to be in the front line Just let them!

A closer look revealed what this "world premiere" was really about - and that it actually cannot be considered one. Others have been busy inline-gold printing. Heidelberg, for instance, has gold in the lacquer box, as well. It remains to be seen whether these techniques were indeed practically tested or whether they are limited to testing labs. A Hug & Co. AG in Arbon for instance, printed beer-labels using gold-inline, as well. Dortmund seems not quite the only one to hold the top position!
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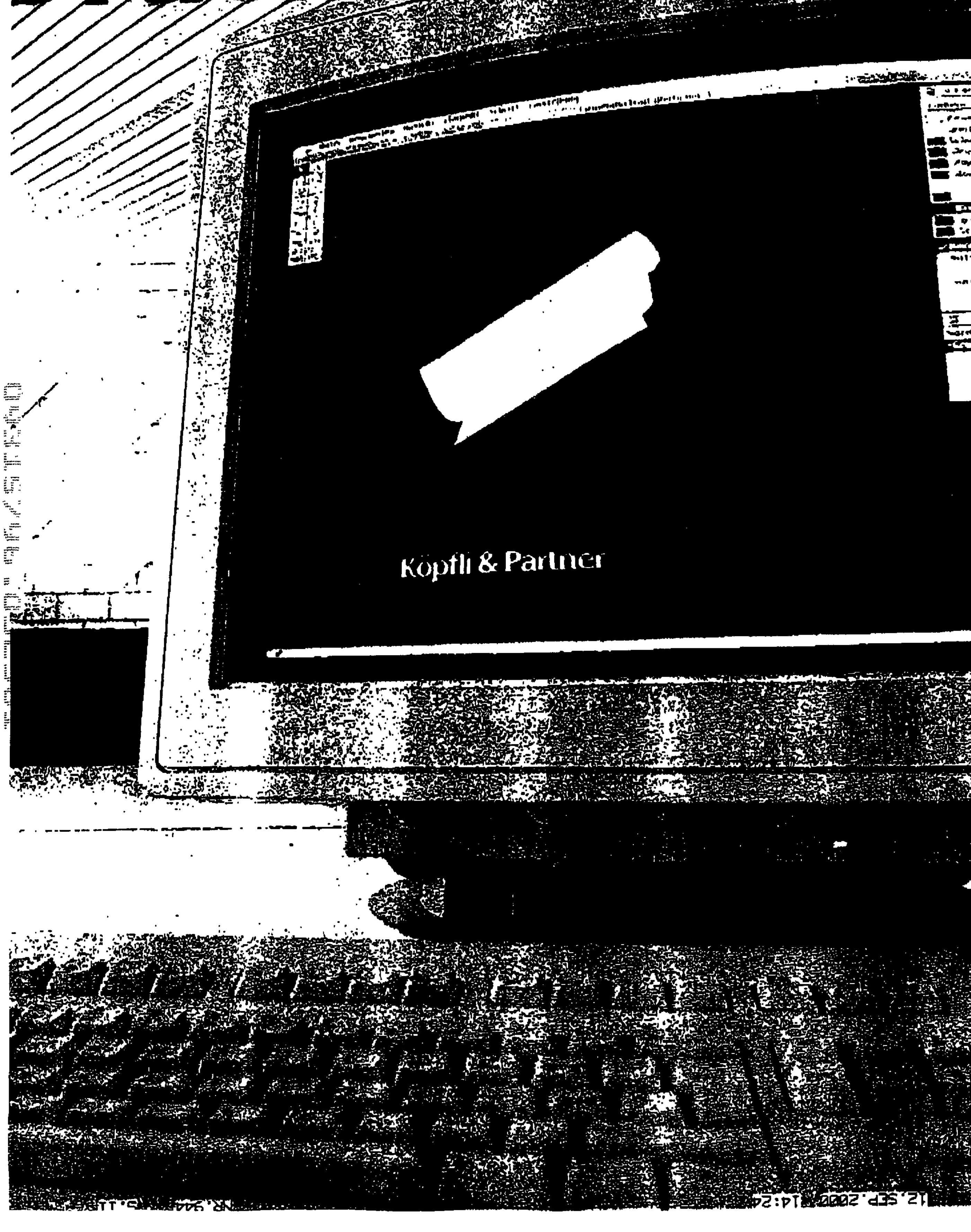
Stellenmarkt, Maschinenanzeiger 11. März 1993

Druck Industrie



DruckIndustrie

Zeitschrift für die grafische Branche der Schweiz
23. Jahrgang
Nr. 5, 11. März 1993

• Organ des Verbandes der Schweizer Druckindustrie (VSD) mit offiziellem Stellenanzeiger
• Mitteilungen des Grafischen Forums Zürich

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VSD: Maurice Wicky

Sekretariat, Anzeigenverwaltung:
Imelda Sonderegger

Druck und Verlag:
Zollikofer AG
Fürstenlandstrasse 122
9001 St. Gallen

Jahres-Abonnementspreis:
Inland Fr. 80.–, Ausland Fr. 100.–
Einzelnummer Fr. 5.–

Inseratenpreis (Stellenanzeiger):
Einspaltige Millimeterzeile
Fr. 1.95, Spaltenbreite 44 mm

Erscheinungsweise:
Zweimal monatlich,
1. und 3. Woche

DI ist einziges schweizerisches Mitglied von Eurographic Press

DruckIndustrie wird auf Biberist Sprint LWC NO Glänzend 80 gm² gedruckt.

Köpfli & Partner AG in Neuenhof bei Baden ist eine moderne Druckerei mit einer 24köpfigen Belegschaft. Das traditionsreiche Unternehmen konnte im Herbst 1991 einen Neubau beziehen und bei dieser Gelegenheit den Maschinenpark mit einer Fünffarben Speedmaster aufstocken.

Verwirrung

In Dortmund hatte MAN Roland zusammen mit der dort ansässigen Druckerei Busche zu einer grossangelegten Presseinformation eingeladen (Seite 22). Gezeigt wurde der Inline-Druck von Gold im Hochdruckverfahren, und dies im Anschluss an mehrfarbigen Offsetdruck. Damit entfällt das Offline-Bronzieren. Primär wird ein Rationalisierungseffekt erzielt. Mehr noch. Die neue Farbe soll keine oder weniger Metallpigmente enthalten. Ein willkommender Beitrag zum Umweltschutz.

So weit, so gut! Nur, was aus der «Chose» gemacht wurde, war eine Verwirrung. Da war sogar die Rede von einem völlig neuen Offsetverfahren und von Weltpremiere. Drucker, Maschinenbauer und Druckfarbenlieferanten – alle wollen die Nase vorne haben. Sollen sie!

Beim näheren Recherchieren wurde bald einmal klar, dass diese Weltpremiere einer Richtigstellung bedarf. Inline-Golddrucken können auch andere. Heidelberg beispielsweise hat auch Gold im Lackkasten. Wie weit es sich um Praxiserprobung oder um Laborversuche handelt, bleibe dahingestellt. Beispielsweise bei A. Hug & Co. AG in Arbon werden ebenfalls Bier-Etiketten mit Gold inline gedruckt. So allein an der Spitze ist man in Dortmund nicht!

Premiere ist insofern richtig, wenn es um die Druckmaschinenbauer aus Offenbach geht. Das Flaggschiff Roland 700 ist hier erstmals gleich mit zwei Lackmodulen gekoppelt. Das zweite Aggregat wird für einen Schutzlack eingesetzt. Maschine und Druckqualität machen einen bestechenden Eindruck. Besser kann man Gold wohl kaum drucken! Und neu ist schliesslich das Ganze für die Druckerei Busche, die zweifellos Pionierleistung für sich in Anspruch nehmen kann.

Warum die Sache so breitwalzen? Goldig inline drucken ja wohl die wenigsten. Das Thema hat symptomatischen Charakter. Innovation muss um jeden Preis her! Nur die Suche danach ist oft mühsam, das Gefundene selbst fragwürdig. Die Nase vorne hat man oft nur scheinbar. Aber es ist in jedem Fall gut, in diesem Glauben zu leben. Das gibt Selbstsicherheit! Neues aber lässt sich nicht mit dem Kopf durch die Wand erzwingen. Und zudem: Neues ist oft nicht Neues, oft Schnee von gestern. Der klare Kopf schützt vor Verwirrung.

Um Verwirrung geht es heute oft. Einmal mehr: Unsere Branche ist (auch) einer strukturellen Krise ausgesetzt. Mit überzeugenden Argumenten lassen sich Angriffe von aussen parieren. Karl Meyer & Co. AG in Allschwil hat zu einem Round-Table eingeladen, das primär aufzeigt, wie sehr und auch wie effizient man sich mit der Entsorgung befasst (Seite 13). Der Bund Schweizer Werbeagenturen (BSW) will eine Kampagne gegen Werbeverbote für Tabak und Alkohol lancieren und diese auch gleich selber berappen.

Sich den Herausforderungen stellen! Warum nicht öfter? Warum wehrt sich die Branche nicht öffentlich gegen Angriffe auf Bedrucktes? An Argumenten fehlt es nicht, etwa die 50 000 Arbeitsplätze der grafischen Industrie. Oder die Waldpflege der Papierindustrie. Oder die Werbung als Motor der Wirtschaft, ohne die nichts geht, usw.

Warum lässt man der Verwirrung um die Akzeptanz unserer Produkte in den Briefkästen soviel Spielraum? Warum nicht Klarheit statt Verwirrung?

Franz Wick

Inhaltsverzeichnis

Nach Golde drängt, am Golde hängt doch alles...

Das Goethe-Zitat ist als Überschrift eines Berichts über eine Fachpresse-Tagung in Dortmund wohl angebracht. Denn um Gold, präziser gesagt: um den Golddruck schlechthin ging es. Dass dem Pionier eines neues Verfahrens auch noch eine Goldmedaille übergeben wurde, war ein sinnvoller Nebeneffekt dieser «goldenen Premiere». Als solche wurde der Anlass bei Busche in Dortmund bezeichnet. Erstmals in dieser Art soll hier Gold industriell im Inline-Verfahren mit einer Mehrfarben-Bogenoffsetmaschine zu Papier gebracht werden. Neu ist dabei die Art des Aufdrucks selbst. Er erfolgt nämlich mittels Hochdrucks und, noch präziser, mittels einer Kunststoffplatte. Ein neues Golddruckverfahren hat bei Busche in Dortmund seinen Anfang genommen.

Der Goldauftrag bisher

Gerade in Deutschlands grosster Bierbrauer-Stadt hat der Golddruck seine besondere Bedeutung. Die Flaschenetiketten müssen goldverziert sein. Aber auch Verpackungen und viele andere Drucksachen sind ohne Gold und Silber nicht vorstellbar. Die Funktion des Verkaufs einer Etikette oder einer Verpackung ist hinlänglich bekannt. Gold- und Silbereffekte auf Verpackungen und Etiketten sollen die besondere Wertigkeit der angebotenen Ware unterstreichen.

Das vordringliche Problem ist nicht der Golddruck, sondern vor allem das Entsorgen des Goldes. Gold- und Silberfarben enthalten Metallpigmente wie Aluminium und Blei. Der Umweltschutz ist auf den Plan gerufen! Die Druckindustrie ist zu innovativem Denken und Handeln aufgefordert.

Wer bisher von Golddruck sprach, dachte an Bogentiefdruck und an Bronzieren auf einer separaten Offsetmaschine. Mit diesen beiden Verfahren ist es möglich, den Goldauftrag in der notwendigen Auftragsmenge auf den Druckträger zu bringen. Tiefdruck und Bronzieren sind aufwendig und teuer. In beiden Fällen handelt es sich um einen separaten Arbeitsprozess. Dazu kommt der bereits erwähnte umweltbelastende Aspekt der Farben.

Zum Vergolden zählt auch der Prägefoliendruck, der wohl als höchste Stufe der Veredelung bezeichnet werden kann. Aus verständlichen Gründen ist dieses Verfahren exklusiv und wird es wohl auch bleiben.

Schliesslich kann Gold im normalen Offsetverfahren gedruckt werden. Aus qualitativen Gründen befriedigt diese Variante kaum. Die Auftragsmenge ist zu gering.

rtin Lange, Vorstandsmitglied MAN Roland, erklärt das «corpus delicti». Durch die male Glasscheibe wird das Innenleben des Lackmoduls ein wenig ersichtlich.

Drei Jahre Entwicklungsarbeit

Bei Busche in Dortmund hat man sich des Golddrucks angenommen. Vater der beachtenswerten Entwicklung ist Klaus Rietzler, Leiter der Abteilung Verfahrenstechnologie. Auf seine Initiative gehen die ersten Pläne zurück, das herkömmliche arbeits- und kostenintensive Bronzieren beim Offsetverfahren durch eine im Effekt vergleichbare, zusammen mit dem Farbdruck ablaufende Inline-Fertigung zu ersetzen.

Nach der Idee die Ausführung Beteiligt daran waren die Münchner Druckfarbenfabrik Michael Huber GmbH (die Mutterfirma von Stehlin + Hostag AG in Lachen), Du Pont de Nemours als Plattenhersteller und MAN Roland als Druckmaschinenbauer. Ziemlich genau drei Jahre hatte die Entwicklung gedauert, ehe man damit an die Öffentlichkeit gelangen konnte Eine beeindruckende Demonstration lässt den Schluss zu: Die Sache ist praxisreif!

Um eine Nasenlänge voraus

Das neue Golddruckverfahren sei jetzt jedermann zugänglich, wurde in Dortmund gesagt. Diese generöse Aussage lässt aber Zweifel zu. Vom Busche-Vortragstisch aus wurde denn auch mit aller Deutlichkeit betont, dass man trotz Freigabe um eine Nasenlänge vorausbleiben wolle. Worin besteht diese Nasenlänge?

Dazu vorerst ein kurzer Systembeschrieb: An eine Fünffarben Roland 700 sind gleich zwei Türme (Module) angebaut. Der Goldauftrag erfolgt im ersten Turm, und zwar ab einer Cyril-Platte von Du Pont. Sie wird mit «0,63» bezeichnet und verfügt über einen weichelastischen Unterbau. Damit haben wir es also mit einem Hochdruckverfahren zu tun. Präziser gesagt, handelt es sich um Flexodruck mit wasserlöslicher Farbe. Es sei eine Offsetgoldfarbe, deren Grundlage wässrige Bindemittel seien, wurde gesagt. Offset- oder Flexofarbe? Die Frage soll vor allem den Farbenhersteller beschäftigen.

Uns interessiert die Nasenlänge. Worin besteht das Geheimnis? Wohl doch sicher darin, wie Offsetdruck und Hochdruck passermässig kombiniert werden können. Da ist zweifellos ein reprotechnischer Kniff dabei, und diese

…e will man nicht auf den Tisch le-… Es müsse sehr präzise gearbeitet …den, wurde umständlich erklärt, …in Wort davon, worin denn diese Prä-…sion eigentlich besteht. Bei Busche …ill man verständlicherweise um eine Nasenlänge vorne bleiben, den Vorsprung nicht so schnell preisgeben. Schliesslich hat man ja auch einiges an Zeit und Geld in die Entwicklung investiert.

Das zweite Modul darf nicht vergessen werden. Es hat nichts Geheimnisvolles mehr an sich. Es ist ein Lackwerk, wie es heute überall vorkommt. Dispersionslack, der zum Glanz und zur Scheuerfestigkeit des Druckgutes beiträgt. Bei Busche werden die vergoldeten Bogen mit einem Überdrucklack versehen.

Première bei Busche in Dortmund: Erstmals wurden an eine Fünffarben Roland 700 zwei Lackmodule angekoppelt. Der Golddruck erfolgt im ersten Modul im Hochdruckverfahren, das zweite Modul wird für einen Überdrucklack eingesetzt.

Zum Patent angemeldet

Dass man Leimölbindemittel weglässt und dafür wässrige Bindemittel einsetzt, ist der ökologische Aspekt der Entwicklung. Dafür ist vor allem die Druckfarbenfabrik Michael Huber München GmbH zuständig. Als Acrylac werden die neuen Gold- und Silberdruckfarben bezeichnet. Die Entwicklung ist seit 1991 zum Patent angemeldet, wobei der Patentschutz sowohl die Herstellungsmaterialien als auch das Herstellungsverfahren selbst umfassen soll.

Die Fachpressekonferenz in Dortmund war eine gute Lektion, die Wissenswertes über Gold- und Silberfarben vermittelte, z.B.:

Je gröber die Teilchen, desto weiter ragen diese aus dem Druckfarbenfilm heraus. Die herausragenden Metallflächen können Licht reflektieren, was zu einem Eindruck von metallischem Glanz führt.

Je glatter die Struktur der herausragenden Teilchen ist, desto grösser ist wiederum der Metalleffekt. An einer unebenen Oberfläche dagegen wird die Reflexion des Lichtes, also der Glanz, durch diffuse Streuung gebrochen.

Durch Auswahl geeigneter Teilchengrössen kann das optimale Verhältnis zwischen Metalleffekt und Ausdruckverhalten/Deckkraft hergestellt werden.

Gegenüber dem Offsetbindemittel ermöglicht das wässrige Bindemittel ein günstigeres Schwimmverhalten der Metallpigmente auf der Oberfläche. Die Pigmente können sich planparallel zur Oberfläche ausrichten.

Aufgrund geringer Farbspaltung bei einem direkt arbeitenden Lackaggregat kann deutlich mehr Farbe übertragen werden. Dadurch können die Metallpigmente grösser gewählt werden, was insgesamt zu einem deutlich besseren Metalleffekt führt.

Zusammengefasst können folgende Besonderheiten von Acrylac Gold festgehalten werden:

- Inline-Fertigung an der Offsetmaschine
- Umweltverträglichkeit, da wasserbasiert und auch schwermetallfrei
- geruchsarm
- grosser Einsatzbereich (Kartonagen, Etiketten)
- Goldeffekt wie beim Tiefdruck

Roland 700 in bester Präsentation

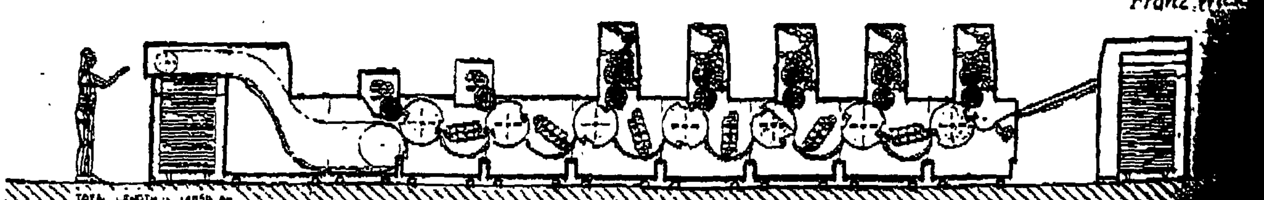
Die «Besichtigung» des neuen Golddruckverfahrens ist wenig ergiebig. Das «Geheimnis» soll durch eine schmale Scheibe auf dem Lackmodul ersichtlich sein. Viel ist da nicht zu sehen! Interessant ist zu hören, dass man demnächst Versuche mit einer Rasterwalze machen will. Also ist die Erprobung noch nicht zu Ende. Kurzfarbwerk für den Golddruck?

Die Maschine läuft mit 12 000 Bogen pro Stunde. Inline-Golddruck nach dem Fünffarben-Offsetdruck und zum Schluss der Überdrucklack.

Fast mehr als das eigentliche Gold vermag die Roland 700 zu faszinieren. Die Maschine scheint jetzt alle Kinderkrankheiten hinter sich zu haben. 1990 wurde sie erstmals an der Drupa präsentiert. Bei Farbendruck Weber in Biel und bei Limmatdruck in Spreitenbach erfolgen in Kürze die ersten Schweizer Installationen. 150 Druckwerke sollen jüngst nach Japan verkauft worden sein.

Doch das ist hier nicht das Thema. Wichtig ist die Feststellung, dass mit dieser Maschine bei Busche der Inline-Golddruck mehr und mehr ökonomische Bedeutung erlangt. Der Golddruck ist vor allem auch schneller und rentabler geworden. Inline-Finishing ist eine Stufe weiterentwickelt. Auf Kosten welcher Verfahren und welcher Unternehmen? Das herkömmliche Bronzieren in separatem Druckgang wird wohl früher oder später der Vergangenheit angehören. Und der Golddruck im Bogentiefdruck, der ja auch aus Offenbach angeboten wird? Man wolle daran festhalten, wurde gesagt. Aber so überzeugend tönte das nicht. Die Zukunft des Golddrucks wird viel eher im Verfahren à la Busche liegen.

Franz Wick…



…ema der Roland 700 mit den beiden Lackmodulen

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

DE 41 22 990 A1

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(12) **Disclosure notice**
(10) **DE 41 22 990 A1**

(51) Intern. Classification[5]:
C 09 D 11/02
B 41M 3/00
// C09D 5/38, 5/36, 17/00, 101/26, 189/00, 171/02, 125/04, 133/04, 191/06, B41G 1/00

(21) File number: P 41 22 990.8
(22) Application date: July 11th 1991
(43) Disclosure date: January 14th 1993

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Application for examination pursuant to § 44 Patent act has been filed.

(54) Bronze or effect printing ink and method for bronze or effect printing.

(57) The invention relates to a bronze or effect printing ink, which can be diluted in water and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup. The invention's printing ink is especially suited to be processed from the coating unit of an offset machine and/or coating machine.

Description

The invention relates to a water-dilutable bronze or effect printing ink

The invention further relates to a method for bronze or effect printing.

In the production of high-quality packaging it is often necessary for creative reasons to carry out machine bronzing to achieve a brilliant gold effect Such a gold effect can not be achieved using conventional offset gold printing inks.

For environmental, workplace health, and cost savings reasons one strives to develop printing inks, which release only very small solvent quantities during drying. Ink systems that can be diluted in water have been found to be well-suited for this purpose

DE-OS 28 39 501 describes a gold bronze printing ink in the form of a sol, consisting of a binding agent with a synthetic resin lacquer, a gel lacquer, a China wood oil lacquer, or of an petroleum based solvent and an amine, and of a gold bronzing powder of an aluminum-containing brass alloy present in the form of fine platelets carrying a fatty acid-surface film, as well as the usual admixtures and supplementary agents. But this ink is not a water-dilutable gold bronze printing ink.

The state of the art in machine bronzing still has the following grave disadvantages:

- Until now a gold underprinting ink had to be printed in a separate processing step.
- The print obtained in this manner is not odorless, which is a drawback, especially in food or cigarette packaging.
- Gold bronzing powder must be applied in an additional, subsequent processing step. Hereby, the excess powder that does not adhere to the gold underprinting ink must be removed by a plush roller.
- Often it is not possible to completely remove the metal powder from the printed surfaces (dusting), which must be seen as a quality defect. The dusting is often a cause of problems, as is the operation at slow machine speeds, which must also be seen as a disadvantage.
- The spent bronze powder has to be reconditioned and must be proportionally added to fresh powder.
- In addition, the work area is contaminated by airborne bronze dust, which can lead to an increased consumption of bronze powder and to adverse health effects.
- Finally, a necessary third separate processing step is necessary for a top coating to fix the bronze particles.

Thus the object of the invention is to provide a bronze or effect printing ink as well as a method for bronze or effect printing, which would overcome these drawbacks. The following conditions must be fulfilled to solve this object:

1. A binding agent must be formulated that on one hand is water-dilutable, and on the other hand does not corrode brass powder From the state of the art one knows of the use of alkaline completely saponified resin solutions and ammoniacal dispersions as exclusive binding agents, but these are unsuitable, as they corrode the bronze particles and are unstable.
2. A suitable bronze quality must be found with regard to the metallic effect and the distribution of particle sizes.
3. An application process for such a novel ink must be found.

In water-dilutable systems with metal pigments these requirements can not be met by single-component printing inks, due to a lack of stabilization

The object is solved by the invention through a printing ink, which is water-dilutable, consists of two components, and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup, whereby it preferably contains 55 to 70% by weight of a component A, and 30 to 45% by weight of a component B. Especially preferred is a printing ink, in which the component A comprises 80 – 100% by weight of a binder system, and 0 to 20% by weight of one or several wax components.

In an embodiment the binder system contains:
0-15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
60-100% by weight styrene- or acrylate dispersions/solutions, in which 35 to 50% by weight is solids, and
0-15% by weight of one or several glycols.

In special embodiments, the styrenes and/or acrylates have a molar weight spectrum between 100,000 to 10,000,000, and ethyl diglycol, ethanediol, or 1,2-propylene glycol are used as glycol.

In a further special embodiment, the employed wax component is a wax on the basis of carnauba-, polyethylene-, or polytetrafluoroethylene wax. Especially preferred is a printing ink, in which the component B contains bronze and or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum-formed platelets and/or one or several color pigments.

The metallic effect of the printed ink is highly independent of the quality of the brass or aluminum powder. Here in particular the particle size distribution is of importance. In addition, one requires a good transfer behavior of the ink in the printing press.

The following single and double polish bronze powders were found to be suitable:
Bleichgold[1] (3-20 µm),
Reichgold (3-20 µm),
Reichbleichgold (3-20 µm),
Reichbleichgold (3-20 µm) pasted in methoxy propanol,
Aluminum (3-20 µm) pasted in methoxy propanol.

In addition to bronze powder, aluminum powder, nacreous pigments such as Iriodine®, Iriobronzen®, high-vacuum- or hydrothermally formed platelets, such as Metalure®, Dekomet®, Paliocrom®, and color pigments can be employed in the same fashion.

[1] Reichgold, Bleichgold, Reichbleichgold = Rich Gold, Pale Gold, Rich Pale Gold, respectively. (The Translator)

The invention's two-component printing ink meets the requirements very well

In the binder system of component A, cellulose ether, collagen, and polyethylene glycol serve as thickening agents and transfer aids in the printing process. Rewopal PEG 6000 PS has been shown to be an especially preferable polyethylene glycol.

The pH value of the styrene- and acrylate dispersions/solutions usually is between 7.0 and 9 0

Suitable styrene- and/or acrylate dispersions or solutions are Zinpol 132® and Zinpol 146®

The glycols employed in the binder system serve as film forming aids and/or drying retarding agents.

To manufacture the invention's two-component ink, at first component A is produced by mixing together a binder system and one or several wax components. The waxes aid in controlling the smoothness and rub resistance of the print. Component B preferably is bronze in paste form, i.e. pasted metal powder To complete the print-ready ink these are then slowly mixed into the binding agent. If necessary, additional common admixtures can be added to the binder system or the printing ink.

The flow time of the printed ink is between 60 and 180 seconds, measured in a flow cup according to DIN 53 211/4 Preferred is a flow time between 60 and 120 seconds, in particular preferred is a flow time between 80 and 120 seconds.

As already mentioned, metal pigments are not suitable for water-dilutable single-component printing inks due to a lack in stability. If no metal pigments are used, a corresponding single-component printing ink will be stable.

Thus, a further embodiment of the invention comprises an effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds in a DIN 53 211/4 flow cup, and containing:

a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50 % by weight,
c) 0 – 15 % by weight one or several glycols,
d) 0 – 20% by weight one or several wax components,
e) 2 – 45 % by weight one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments

The styrenes and/or acrylates, glycols, wax components, nacreous pigments, high-vacuum-formed platelets, and color pigments are the same as for the two-component ink.

A suitable process for application of the invention's printing ink was found to be the processing out of a coating unit of an offset machine and/or coating machine, or out of a flexo printing unit.

This is due to the distance between the ink reservoir (lacquer tank) and the material to be printed being short in this particular case, which reduces ink separation. Especially advantageous is the application by a direct-acting coating application system in sheet-fed offset machines. The form cylinder can be operated with a blanket or with polymer printing plates of the type APR, Napp, Cyrel, Nyloflex, or Nyloprint, or with printing plates with self-adhesive polymer sheets.

The invention is explained with the help of examples.

Examples 1 to 3 and 6 to 10

We printed on a Heidelberger-Speedmaster sheet-fed offset machine that was equipped with a Cyrel-plate with underlay blanket (green, 2mm) and a type 75 anilox roller (ink cell depth 30 µm).

Example 1

The printing ink had the following composition:

8.25 kg Zinpol 146®
0.75 kg water
6 00 kg *Reichbleichgold* (8µm) (90%)

This corresponds to a water content of 5%, a pigment paste content of 40% and a pigment content of 36%

Example 2

The printing ink had the following composition.

11.00 kg Zinpol 146®
3.00 kg water
8.00 kg bronze (8µm) (90%)

This corresponds to a water content of 13.6%, a pigment paste content of 36%, and a pigment content of 33%.

Example 3

The printing ink had the following composition:

9.60 kg Zinpol 146®
7 00 kg *Reichbleichgold* paste (8µm) (90%)
0.70 kg propylene glycol (retarding agent)
0 70 kg water

This corresponds to a water content of 4%, a retarding agent content of 4%, a pigment paste content of 38.8%, and a pigment content of 35.0%.

In all three of examples 1 to 3, the print was good to excellent, and the gold effect was acceptable.

Examples 4 and 5

These were implemented like examples 1 to 3, but the anilox roller was replaced by a chromium roller

Example 4

The printing ink had a composition identical to that of the ink of example 3

Example 5

The printing ink had the following composition.

9 625 kg Zinpol 146®
7.000 kg *Reichbleichgold* (8µm) (90%)
0 950 kg water
1 700 kg propylene glycol

This corresponds to a water content of 4 9%, a retarding agent content of 8.8%, a pigment paste content of 36%, and a pigment content of 33%. The exposure times of the photo polymer plate were varied (22 sec to 28 sec). The best result was achieved by a photo polymer plate with an exposure time of 28 sec.

In examples 4 and 5, the print was good to excellent, and the gold effect was good to excellent as well.

Example 6

The printing ink had the following composition.
5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodin 153®

Example 7

5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodine 300®

Example 8

9.3 kg Zinpol 146®
0.4 kg propylene glycol
0 3 kg Metalure Type L 55350 AE®

Example 9

7.4 kg Zinpol 126®
0.5 kg propylene glycol
2.1 kg Fanalblau D 6390®

Example 10

9.0 kg Zinpol 146®
0.2 kg propylene glycol
0.3 kg Metalure L 55350 AE®
0.4 kg Irgalith yellow LBIW®
0.2 kg Irgalith orange F2G®

In examples 6 to 10, the print was good to excellent, and the color effect was good to excellent as well.

Using the invention's printing ink and method it is now possible to achieve a metal effect comparable to that of state of the art bronzing, with smooth, solid printing of areas or open print of reverse types. Moreover, this bronze effect can now be achieved in an online-process.

Patent claims

1 Bronze or effect printing ink characterized by being water-dilutable, consisting of two components, and having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup.

2. Printing ink of claim 1 containing
55 – 70% by weight of a first component A and
30 – 45% by weight of a second component B.

3 Printing ink of claim 2 wherein
80 – 100% by weight of component A is a binder system and 0 – 20% by weight are one or several wax components

4. Printing ink of claim 3 wherein
the binder system contains
0-15 % by weight cellulose ether and/or collagen and/or polyethylene glycol,
60 – 100% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight, and
0 – 15% by weight one or several glycols

5 Effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup, and containing:
a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight
c) 0 – 15% by weight one or several glycols
d) 0 – 20% by weight one or several wax components
e) 2 – 45 % one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

6. Printing ink of claim 4 or 5 wherein
the styrenes or acrylates have a molar weight range between 100,000 and 10,000,000

7. Printing ink of claim 4 or 5 wherein
the employed glycol is ethyl diglycol, ethanediol, or 1,2-propylene glycol.

8. Printing ink of one of claims 3 to 7 wherein
the wax component is based on carnauba-, polyethylene-, or polytetrafluoroethylene wax.

9 Printing ink of one of claims 2, 3, 4, 6, 7, or 8 wherein
component B contains bronze and/or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

10. Printing ink of claim 9 wherein
the employed bronze is *Bleichgold*, *Reichgold*, or *Reichbleichgold*.

11. Printing ink of claim 5 or 9 wherein
the employed nacreous pigments are Iriodine® and/or Iriobronzen®, and the employed high-vacuum-formed platelets are Metalure® and/or Dekomet® and/or Palicrom®.

12. Method for bronze or effect printing, wherein
a printing ink of one of claims 1 to 11 is processed out of the coating unit of an offset machine and/or coating machine, or out of a flexo printing unit

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Offenlegungsschrift**

(10) **DE 41 22 990 A1**

(51) Int. Cl.[5]:
C 09 D 11/02
B 41 M 3/00
// C09D 5/38,5/30, 17/00,101/26,189/00, 171/02,125/04, 133/04,181/08,B41G 1/00

(21) Aktenzeichen: P 41 22 990.8
(22) Anmeldetag: 11. 7. 91
(43) Offenlegungstag: 14. 1. 93

DE 41 22 990 A1

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Prüfungsantrag gem. § 44 PatG ist gestellt

(54) **Bronze- oder Effektdruckfarbe und Verfahren zur Herstellung eines Bronze- oder Effektdruckes**

(57) Die Erfindung betrifft eine wasserverdünnbare Bronze- oder Effektdruckfarbe, die eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53211/4 aufweist. Die erfindungsgemäße Druckfarbe ist insbesondere dazu bestimmt, aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine verarbeitet zu werden.

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Beschreibung

Die Erfindung betrifft eine wasserverdünnbare Bronze- oder Effektdruckfarbe.

Die Erfindung betrifft ferner ein Verfahren zur Herstellung eines Bronze- oder Effektdruckes.

Bei der Herstellung hochwertiger Verpackungen ist es aus gestalterischen Gründen häufig notwendig zur Erzielung eines brillianten Goldeffektes eine Maschinenbronzierung durchzuführen. Mit herkömmlichen Offset-Golddruckfarben läßt sich ein solcher Goldeffekt nicht erzielen.

Aus Gründen des Umweltschutzes, der Arbeitsplatzhygiene und der Kosteneinsparung ist man ferner bestrebt Druckfarben zu entwickeln, die bei der Trocknung möglichst geringe Lösungsmittelmengen freisetzen. Wasserverdünnbare Farbsysteme haben sich als hierfür geeignet erwiesen.

In der DE-OS 28 39 501 wird eine Goldbronzedruckfarbe in Form eines Sols beschrieben, die aus einem Bindemittel mit einem Kunstharzlack, einem Gellack, einem Tungöllack oder einem Erdöllösungsmittel und einem Amin besteht und einem Goldbronzepulver aus einer Aluminium enthaltenden Messinglegierung, das in Form feiner Plättchen vorliegt, die eine Oberflächenfettsäureschicht tragen, sowie ggf. üblichen Zusatzstoffen und Hilfsmitteln. Bei dieser Farbe handelt es sich jedoch um keine wasserverdünnbare Goldbronzedruckfarbe.

Die Maschinenbronzierung nach dem Stand der Technik weist jedoch folgende, schwerwiegende Nachteile auf:

- Es mußte bisher in einem separaten Arbeitsgang eine Goldunterdruckfarbe gedruckt werden.
- Der damit hergestellte Druck ist nicht geruchsarm, was insbesondere bei Lebensmitteln- bzw. Zigarettenverpackungen nachteilig ist.
- Anschließend muß in einem weiteren Arbeitsgang Goldbronzepuder aufgetragen werden. Der dabei nicht auf der Goldunterdruckfarbe haftende Überschuß muß durch eine Plüschwalzenwischung entfernt werden.
- Die vollständige Entfernung des Metallschliffs von den bedruckten Oberflächen (Abstauben) gelingt häufig nicht, was als ein Qualitätsmangel anzusehen ist. Das Abstauben ist häufig mit Schwierigkeiten verbunden, wie das Fahren mit geringen Maschinengeschwindigkeiten, was ebenfalls als Nachteil anzusehen ist.
- Das gebrauchte Bronzepulver muß wieder aufbereitet und neuem Pulver anteilig zudosiert werden.
- Desweiteren entstehen im Arbeitsbereich Verunreinigungen durch Bronzeflugstaub, der sowohl zu einem Mehrverbrauch an Bronzepulver als auch zu gesundheitlichen Beeinträchtigungen führen kann.
- Zur Fixierung der Bronzepartikel muß schließlich in einem dritten separaten Arbeitsgang überlackiert werden.

Die Aufgabe der Erfindung besteht somit darin, sowohl eine Bronze- oder Effektdruckfarbe als auch ein Verfahren zur Herstellung eines Bronze- oder Effektdruckes zur Verfügung zu stellen, mit denen diese Nachteile überwunden werden können.

Zur Lösung dieser Aufgabe müssen folgende Bedingungen erfüllt werden:

1. Es muß ein Bindemittel formuliert werden, das einerseits wasserverdünnbar ist und andererseits Messingschliff nicht korrodiert. Aus dem Stand der Technik bekannte alkalisch komplett verseifte Harzlösungen und ammoniakalische Dispersionen als Alleinbindemittel sind ungeeignet, da sie die Bronzeteilchen korrodieren und instabil sind.
2. Es muß hinsichtlich des Metalleffekts und der Partikelgrößenverteilung eine geeignete Bronzequalität gefunden werden.
3. Es muß für eine derartige neue Farbe ein Applikationsverfahren gefunden werden.

Diese Bedingungen können bei wasserverdünnbaren metallpigmentierten Systemen durch Einkomponenten-Druckfarben aufgrund mangelnder Stabilisierung nicht erreicht werden.

Die Aufgabe wird erfindungsgemäß durch eine Druckfarbe gelöst, die wasserverdünnbar ist, aus zwei Komponenten besteht und eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53211/4 aufweist, wobei sie vorzugsweise eine Komponente A mit 55 bis 70 Gew.-% und eine zweite Komponente B mit 30 bis 45 Gew.-% umfaßt. Besonders bevorzugt ist eine Druckfarbe, bei der die Komponente A 80–100 Gew.-% eines Bindemittelsystems und 0 bis 20 Gew.-% eines oder mehrerer Wachskomponenten umfaßt.

In einer Ausführungsform umfaßt das Bindemittelsystem
0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol
60–100 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-% und
0–15 Gew.-% einem oder mehrerer Glycole.

In speziellen Ausführungsformen weisen die Styrole- und/oder Acrylate einen Molmassenbereich von 100 000 bis 10 000 000 auf und als Glycol werden Ethyldiglycol, Ethandiol oder 1,2-Propylenglycol eingesetzt.

In einer weiteren speziellen Ausführungsform wird als Wachskomponente Wachs auf der Basis von Carnauba-, Polyethylen- oder Polytetrafluorethylen-Wachs eingesetzt. Besonders bevorzugt ist ferner eine Druckfarbe bei der die Komponente B Bronze und/oder Aluminium in Schliff- oder Pastenform und/oder ein oder mehrere Perlglanzpigmente und/oder im Hochvakuum erzeugte Plättchen und/oder ein oder mehrere Farbpigmente umfaßt.

Der Metalleffekt der verdruckten Farbe ist in starkem Maße abhängig von der eingesetzten Messing- oder Aluminium-Schliffqualität. Insbesondere ist hierbei die Teilchengrößenverteilung von Einfluß. Daneben ist ein gutes Übertragungsverhalten der Farbe in der Druckmaschine erforderlich.

Folgande einfache und doppeltpolierte Bronzen haben sich als geeignet erwiesen:
Bleichgold (3–20 µm),
Reichgold (3–20 µm),
Reichbleichgold (3–20 µm),
Reichbleichgold (3–20 µm) angeteigt in Methoxypropanol,
Aluminium (3–20 µm) angeteigt in Methoxypropanol.

Neben Bronzeschliff können auch Aluminiumschliff, Perlglanzpigmente, wie Iriodine®, Iriobronzen®, im Hochvakuum oder hydrothermal erzeugte Plättchen,

wie Metalure®, Dekomet®, Paliocrom® und Farbpigmente in gleicher Weise eingesetzt werden.

Die erfindungsgemäße Zweikomponenten-Druckfarbe erfüllt die gestellten Anforderungen sehr gut.

In dem Bindemittel-System der Komponente A dienen Celluloseether, Kollagen und Polyethylenglycol als Verdickungsmittel und Übertragungshilfe beim Druckprozeß. Als besonders vorteilhaftes Polyethylenglycol hat sich Rewopal PEG 6000 PS erwiesen.

Der pH-Wert der Styrol- und Acrylatdispersionen/-lösungen liegt üblicherweise zwischen 7,0 und 9,0.

Als geeignete Styrol- und/oder Acrylatdispersionen bzw. -lösungen haben sich Zinpol 132® und Zinpol 146® erwiesen.

Die im Bindemittelsystem verwendeten Glycole dienen als Filmbildungshilfsmittel und/oder Trocknungsverzögerer.

Zur Herstellung der erfindungsgemäßen Zweikomponentenfarbe wird zunächst die Komponente A aus dem Bindemittelsystem und einer oder mehrerer Wachskomponenten durch Zusammenmischen hergestellt. Die Wachse dienen der Einstellung der Glätte und Scheuerfestigkeit der Drucke. Als Komponenten B werden vorzugsweise Bronzen in Pastenform, d. h. angeteigte Metallschliffe verwendet. Zur Formulierung der druckfertigen Farbe werden diese dann mit dem Bindemittel langsam verrührt. Gegebenenfalls können dem Bindemittelsystem oder der Druckfarbe weitere übliche Zusätze hinzugefügt werden.

Die Auslaufzeit der verdruckten Farbe liegt zwischen 60 und 180 Sekunden Auslaufzeit, gemessen im Auslaufbecher nach DIN 53 211/4. Bevorzugt wird eine Auslaufzeit zwischen 60 und 120 Sekunden, insbesondere bevorzugt ist eine Auslaufzeit zwischen 80 und 120 Sekunden.

Wie bereits ausgeführt, sind Metallpigmente aufgrund mangelnder Stabilität für wasserverdünnbare Einkomponentendruckfarben nicht geeignet. Werden keine Metallpigmente eingesetzt, wird eine entsprechende Einkomponentendruckfarbe stabil sein.

Eine weitere Ausführungsform der Erfindung umfaßt daher eine Effektdruckfarbe, die dadurch gekennzeichnet ist, daß sie wasserverdünnbar ist, eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist und

a) 0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
b) 40–95 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-%,
c) 0–15 Gew.-% eines oder mehrerer Glycole,
d) 0–20 Gew.-% eines oder mehrerer Wachskomponenten,
e) 2–45 Gew.-% eines oder mehrerer Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugter Plättchen und/oder eines oder mehrerer Farbpigmente umfaßt.

Die hierbei eingesetzten Styrole und/oder Acrylate, Glycole, Wachskomponenten, Perlglanzpigmente, im Hochvakuum erzeugte Plättchen, und Farbpigmente sind die gleichen wie bei der Zweikomponentenfarbe.

Als Applikationsverfahren für die erfindungsgemäße Druckfarbe erwies sich die Verarbeitung aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine oder aus einem Flexodruckwerk als vorteilhaft. Dies liegt daran, daß der Weg vom Farbvorratsbehälter (Lackwanne) zum Bedruckstoff in diesem Falle kurz ist, so daß die Anzahl der Farbspaltungen gering bleibt. Als besonders vorteilhaft hat sich die Applikation über direkt auftragende Lackauftragungssysteme im Bogenoffsetmaschinen erwiesen. Der Formzylinder kann mit einem Gummituch oder Polymerklischees vom Typ APR, Napp, Cyrel, Nyloflex oder Nyloprint oder auch Druckplatten mit selbstklebender Polymerfolie belegt sein.

Die Beispiele erläutern die Erfindung.

Beispiele 1 bis 3 und 6 bis 10

Es wurde auf einer Heidelberger-Speedmaster-Bogenoffsetmaschine, die mit einer Cyrel-Platte mit Untertuch (grün, 2 mm) und einer 75er Rasterwalze (Näpfchentiefe 30 µm) ausgerüstet war, gedruckt.

Beispiel 1

Die Druckfarbe hat folgende Rezeptur:
8,25 kg Zinpol 146®
0,75 kg Wasser,
6,00 kg Reichbleichgold (8 µm) (90%ig)
Dies entspricht einem Wassergehalt von 5%, einem Pigmentenpastenanteil von 40% und einem Pigmentanteil von 36%.

Beispiel 2

Die Druckfarbe hat folgende Rezeptur:
11,00 kg Zinpol 146®
3,00 kg Wasser 8,00 kg Bronze (8 µm) (90%ig)
Dies entspricht einem Wassergehalt von 13,6%, einem Pigmentenpastenanteil von 36,0% und einem Pigmentanteil von 33%.

Beispiel 3

Die Druckfarbe hat folgende Rezeptur:
9,60 kg Zinpol 146®
7,00 kg Reichbleichgold-Paste (8 µm) (90%ig),
0,70 kg Propylenglycol (Verzögerer),
0,70 kg Wasser
Dies entspricht einem Wassergehalt von 4%, einem Verzögerergehalt von 4%, einem Pigmentpastenanteil von 38,8% und einem Pigmentanteil von 35,0%.

In allen drei Beispielen 1 bis 3 war der Ausdruck gut bis sehr gut und der Goldeffekt in Ordnung.

Beispiele 4 und 5

Die Durchführung erfolgte entsprechend den Beispielen 1 bis 3, wobei jedoch die Rasterwalze durch eine Chromwalze ersetzt war.

Beispiel 4

Die Druckfarbe hat die identische Rezeptur wie die in Beispiel 3.

Beispiel 5

Die Druckfarbe hat folgende Rezeptur:
9,625 kg Zinpol 146®
7,000 kg Reichbl[illegible]chgold (8 µm) (90%ig)
0,950 kg Wasser
1,700 kg Propylenglycol
Dies entspricht einem Wassergehalt von 4,9%, einem

Verzögereranteil von 4,8%, Pigmentenpastenanteil von 36% und einem Pigmentanteil von 33%. Die Fotopolymerplatte wurde unterschiedlich lang belichtet (22 s bis 28 s). Das beste Ergebnis zeigte eine Fotopolymerplatte mit einer Belichtungszeit von 28 s.

In den Beispielen 4 und 5 war das Ausdrucken gut bis sehr gut und der Goldeffekt ebenfalls gut bis sehr gut.

Beispiel 6

Die Druckfarbe hat folgende Rezeptur:
5 kg Zinpol 146®
1 kg Propylenglycol
4 kg Iriodin 153®

Beispiel 7

5 kg Zinpol 146®
1 kg Propylenglycol
4 kg Iriodine 300®

Beispiel 8

9,3 kg Zinpol 146®
0,4 kg Propylenglycol
0,3 kg Metalure Typ L 55350 AE®

Beispiel 9

7,4 kg Zinpol 128®
0,5 kg Propylenglycol
2,1 kg Fanalblau D 6390®

Beispiel 10

9,0 kg Zinpol 146®
0,2 kg Propylenglycol
0,3 kg Metalure L 55350 AE®
0,4 kg Irgalith gelb LBIW®
0,2 kg Irgalith orange F2G®

In den Beispielen 6 bis 10 war das Ausdrucken gut bis sehr gut und der Farbeffekt ebenfalls gut bis sehr gut.

Durch die erfindungsgemäße Druckfarbe und das Verfahren ist es somit jetzt möglich ein der Bronzierung des Standes der Technik vergleichbaren Metalleffekt mit glattem, geschlossenem Ausdruck von Flächen bzw. offenen Ausdrucken in negativen Schriften zu erreichen. Darüberhinaus kann dieser Bronzeeffekt nunmehr im Online-Verfahren realisiert werden.

Patentansprüche

1. Bronze- oder Effektdruckfarbe, dadurch gekennzeichnet, daß sie wasserverdünnbar ist, aus zwei Komponenten besteht und eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist.

2. Druckfarbe nach Anspruch 1, dadurch gekennzeichnet, daß sie
55 – 70 Gew.-% einer ersten Komponente A und
30 – 45 Gew.-% einer zweiten Komponente B
umfaßt.

3. Druckfarbe nach Anspruch 2, dadurch gekennzeichnet, daß Komponente A
80 – 100 Gew.-% eines Bindemittelsystems und
0 – 20 Gew.-% eines oder mehrerer Wachskomponenten
umfaßt.

4. Druckfarbe nach Anspruch 3, dadurch gekennzeichnet, daß das Bindemittelsystem
0 – 15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
60 – 100 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-% und
0 – 15 Gew.-% eines oder mehrerer Glycole umfaßt.

5. Effektdruckfarbe, dadurch gekennzeichnet, daß sie wasserverdünnbar ist, eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist und
a) 0 – 15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
b) 40 – 95 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-%,
c) 0 – 15 Gew.-% eines oder mehrerer Glycole,
d) 0 – 20 Gew.-% eines oder mehrerer Wachskomponenten,
e) 2 – 45 Gew.-% eines oder mehrerer Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugter Plättchen und/oder eines oder mehrerer Farbpigmente umfaßt.

6. Druckfarbe nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß die Styrole und/oder Acrylate einen Molmassenbereich von 100 000 bis 10 000 000 aufweisen.

7. Druckfarbe nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß als Glycol Ethyldiglycol, Ethandiol oder 1,2-Propylenglycol eingesetzt wird.

8. Druckfarbe nach einem der Ansprüche 3 bis 7, dadurch gekennzeichnet, daß als Wachskomponente Wachs auf der Basis von Carnauba-, Polyethylen- oder Polytetrafluorethylen-Wachs eingesetzt wird.

9. Druckfarbe nach einem der Ansprüche 2, 3, 4, 6, 7 oder 8, dadurch gekennzeichnet, daß Komponente B Bronze und/oder Aluminium in Schliff oder Pastenform und/oder ein oder mehrere Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugte Plättchen und/oder ein oder mehrere Farbpigmente umfaßt.

10. Druckfarbe nach Anspruch 9, dadurch gekennzeichnet, daß als Bronze Bleichgold, Reichgold oder Reichbleichgold eingesetzt wird.

11. Druckfarbe nach Anspruch 5 oder 9, dadurch gekennzeichnet, daß als Perlglanzpigmente Iriodine® und/oder Iriobronzen®, daß als im Hochvakuum erzeugte Plättchen Metalure® und/oder Dekomet® und/oder Paliocrom® eingesetzt wird.

12. Verfahren zur Herstellung eines Bronze- oder Effektdrucks, dadurch gekennzeichnet, daß eine Druckfarbe nach einem der Ansprüche 1 bis 11 aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine oder aus einem Flexodruckwerk verarbeitet wird.

PATENT NO EP (UK) **0620115**

TRANSLATION OF EUROPEAN PATENT (UK) UNDER SECTION 77 (6) (a)

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MAN Roland Druckmaschinen AG, Mühlheimer Strasse 341
D-63075 Offenbach, Germany

Patents ADP number *(if you know it)*

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W018706

PATENTS ACT 1977

In the matter of
European Patent (UK)
0620115

DECLARATION

I, Richard John Gallafent, a Chartered Patent Agent, of 9 Staple Inn, London WC1V 7QH, declare that I am the translator of the document attached and certify that it is a true translation to the best of my knowledge and belief of the final text in European Patent Application 94103832.5, which is to be granted as European Patent 0620115.

....
RICHARD JOHN GALLAFENT

9 October 1996
....
DATE

W018707

The invention relates to a device for coating material to be printed in multi-colour offset printing presses with multiple varnishing units (see, e.g. DE-A-3941571).

In the Journal FlexoPrint 2-93, pages 42-43, it is stated in the article "Gold varnish print replaces metal bronzing" that in a multi-colour offset printing press with two so-called varnish towers, a gold varnish ink was processed. For this, one varnish tower was converted to be a flexoprint unit, wherein using conventional varnishing technology, a flexo printing plate is used for coating. In contrast to the conventional varnish metering, attention is directed to the option of using a comb doctor.

An application unit for highly viscous oil-containing or low viscous water-soluble layers is known from DE 3 906 648 A1. This applicator unit is constructed as a varnish device, according to choice as offset, relief or intaglio print unit. The embodiments start out from a structured scoop roller which correspondingly with a doctor blade or by means of an applicator roller and a structured forme cylinder which corresponds with a doctor blade. The letterpress printing unit consists in this connection of a scoop roller profiled with little depressions to which a doctor blade is arranged, a transfer roller to which smoothing rollers are arranged and a forme cylinder with a relief forme.

From DE 4 122 990 A1, a bronzing and effect printing ink and a process for manufacturing a bronzing and effect print are known. There a water-thinnable printing ink of high viscosity and high pigment content is described. This should be processed from the varnishing unit of an offset press or a flexo printing unit. Given as an advantage is the short working path with few ink splittings.

Known, for example, from DE 3 614 582 A1 is a so-called chamber doctor for applying a coating composition to a coating roller. At least two doctor blades lying against a roller form a chamber for the receipt of a composition which is fed in under pressure.

It is the object of the invention further to develop a coating device of the type known, e.g. from the document DE-A-3941571 in order, in simple fashion, to make possible problem-free in-line operation with rapidly evaporating aqueous printing inks or printing varnishes with a high pigment content or coarse pigments combined with further treating, printing or coating processes.

The problem is solved by the features of the main claim. Further developments are evident from the sub-claims.

The solution in accordance with the invention permits the in-line coating with higher viscosity liquids to be undertaken in an offset printing press with particular reference to varnishes or pigmented inks on an aqueous basis (metallic effect print). Areas of application consist in separate area varnishing (spot varnishing) or full surface varnishing. Because of the closed chamber at the chamber doctor, the evaporation of the liquid used is reduced. Thereby processing rapidly evaporating, e.g. water-soluble liquids, is improved. The combination of several offset printing units and at least one flexo printing unit can result in differing arrangements, wherein with respect to this unit as a rule a further varnishing unit, e.g. for full surface varnishing, is installed downstream.

The invention is explained by way of example in what follows. In this connection

Fig. 1 shows a first device for coating and

Fig. 2 a variant of the device for coating.

In Figure 1, a multi-colour offset printing press with two varnishing units is shown. The offset printing press (here without feeder and delivery) consists of five printing units 1 to 5, then afterwards in the sheet running direction a coating unit equipped as a flexo print unit 6 and arranged after this a customary varnishing unit 7. In this connection, the flexo print unit 6 can be used as a spot varnishing unit (for separate area varnishing) and the subsequently arranged varnishing unit 7 for full surface surface finishing.

The flexo print unit 6 as well as the varnishing unit 7 also consists in each case of a impression cylinder 8.1, 8.2 a transfer drum 9.1, 9.2 and a forme cylinder 10.1, 10.2.

In the flexo print unit 6, a flexible relief printing plate is tensioned on to the forme cylinder 10.1, e.g. a flexo print plate. In contact with the forme cylinder 10.1 is arranged an applicator roller 11 with a structured surface with a grid of little depressions, a so-called raster roller. Settable against the applicator roller 11 there is a chamber doctor 12 arranged relative to this. The chamber doctor 12 can, e.g. be provided at its upper side centrally with a liquid feed and two outlet liquid drains in the region of the side parts. The liquid feed is connected with a feed pump, the liquid outlets 11 in contrast with a suction pump. The pumps are necessary in order to be able to work particularly with liquid of high viscosity because of pigmentation, e.g. on an aqueous basis, such as, e.g. gold and silver printing inks, cover white or varnish.

The coating composition for inking up the relief print form on the forme cylinder is transported via the raster depressions of the applicator roller 11 and applied on to the material to be printed fed from the impression cylinder 8.1. During the liquid transport effected by the applicator roller 11, the chamber doctor 12 takes care that the liquid remains exclusively in the raster depressions.

The varnishing unit 7 has in contrast a pair of rollers to form a metering slot. In this connection, a metering roller 13 is set against an applicator roller 14. The coating composition is fed directly into the slot between both rollers and fed via the applicator roller 14 to the forme cylinder 10.2. This then applies it at the impression cylinder 8.2 on to the material to be printed which is fed in.

By the staggered arrangement of offset printing flexo printing and varnishing, especially for metal gloss coatings a particularly good working result can be achieved. In this connection, the combination of rapid working of the easily evaporating metal printing inks or the printing lacquers with a subsequent gloss-enhancing varnish coating is to be recommended.

A comparable system is illustrated in Figure 2. Here the flexo print unit 6 is put prior to the first printing unit 1 of the offset printing press. With this sort of configuration, basic coats can be applied before printing, e.g. cover white coatings on to sheet material, plastics, foils or card. The final varnishing can furthermore be made possible in that a varnishing unit 7 is arranged after the last printing unit 5 or also an integrated varnishing unit is arranged on a conventional printing unit.

Also comparable is an arrangement of the flexo print unit 6 within the offset printing press for the application of intermediate coatings and if needed with a drying function.

W018710

Patent claims

1) Device in a rotary printing press for multi-colour offset printing for coating material to be printed with at least two varnishing units, wherein each varnishing unit has an impression cylinder (8), a forme cylinder (10) and an applicator roller (11, 14), and the varnishing unit arranged upstream corresponding to the sheet running direction is constructed as a flexo print unit (6), wherein the flexo print unit (6) consists of the following elements:
a relief forme carrying forme cylinder (10.1) which is in contact with the impression cylinder (8.1), an applicator roller (11) with a raster structure, which is in contact with the forme cylinder (10.1) and a settable-on chamber doctor (12) which is connected with a feed pump for liquid feed and a suction pump for liquid return wherein directly or indirectly arranged after the flexo print unit (6) is a varnishing unit (7) and wherein in the varnishing unit (7) an applicator roller (14) is provided relative to which a metering roller (13) is arranged to form a common metering slot.

2) Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press between the printing units (1-5).

3) Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press prior to the printing units (1-5).

4) Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press subsequent to the printing units (1-5).

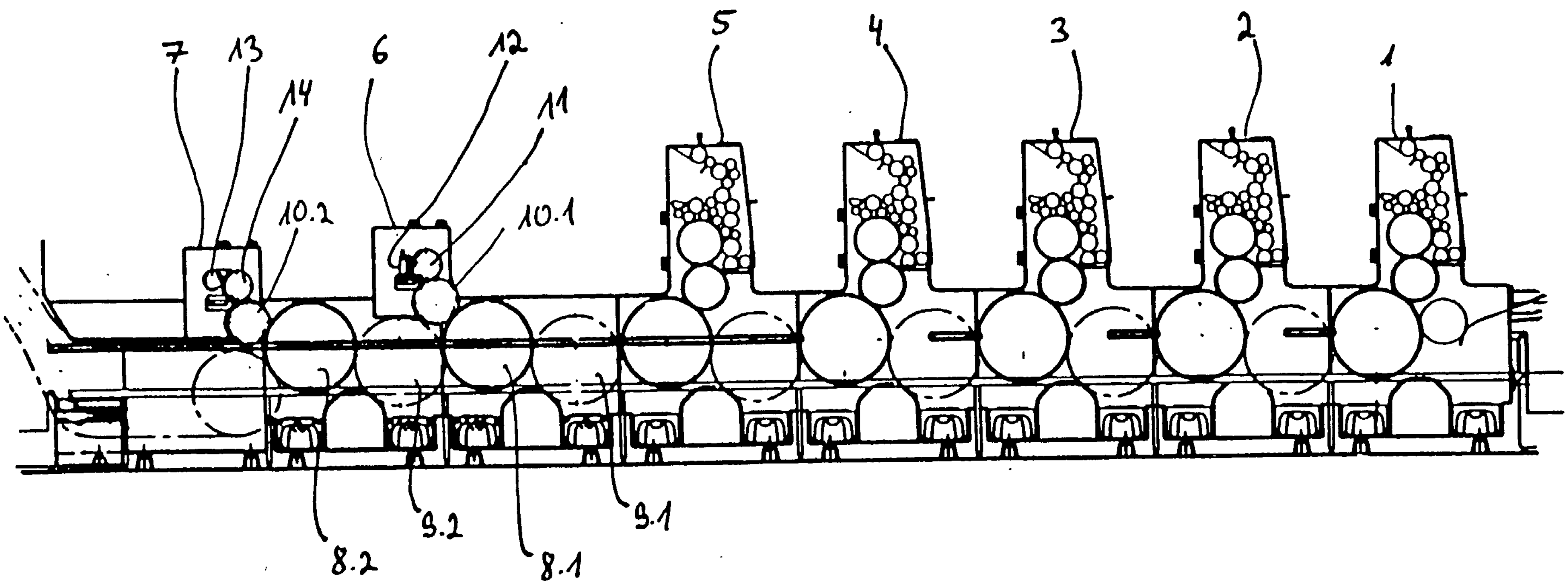

Fig. 1

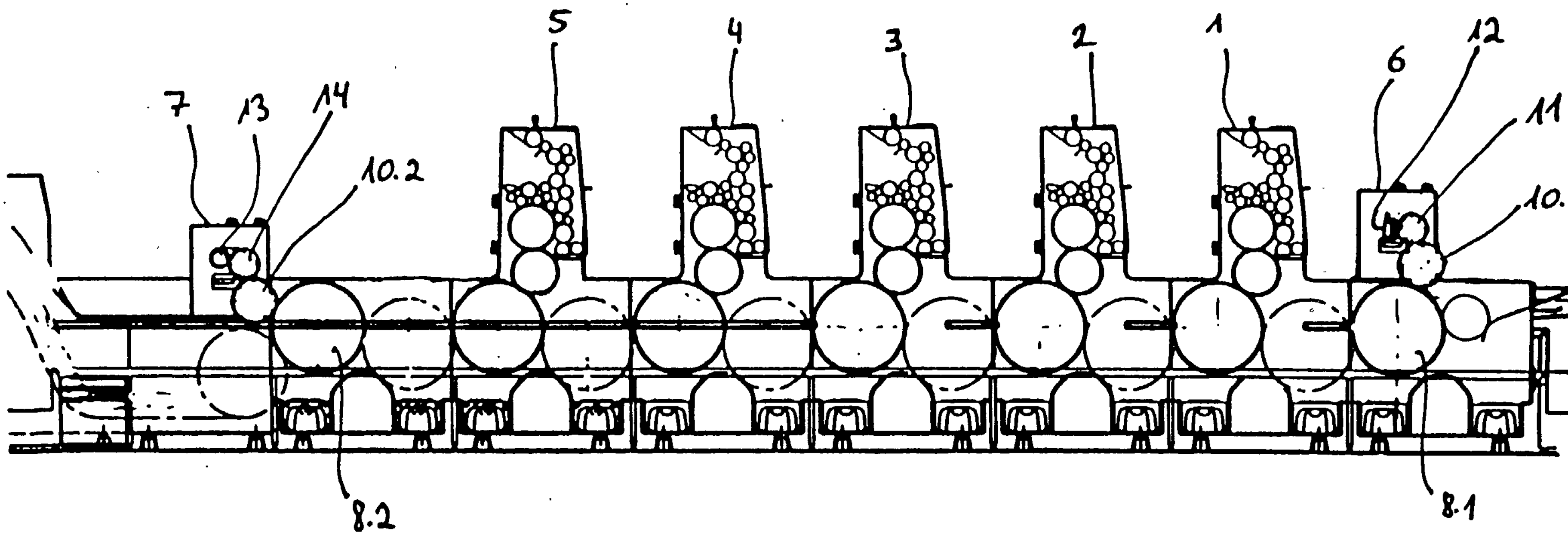

Fig. 2

W018713

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 620 115 B1

(12) # EUROPÄISCHE PATENTSCHRIFT

(45) Veröffentlichungstag und Bekanntmachung des Hinweises auf die Patenterteilung:
23.04.1997 Patentblatt 1997/17

(51) Int. Cl.^{6}: **B41F 23/08**, B41F 7/06, B41F 5/24

(21) Anmeldenummer: **94103832.5**

(22) Anmeldetag: **12.03.1994**

(54) **Einrichtung zum Inline-Beschichten von Bedruckstoffen in Offsetdruckmaschinen**

In-line coating device in printing machines

Dispositif de revêtement en ligne dans des machines d'impression

(84) Benannte Vertragsstaaten:
AT BE CH DE ES FR GB IT LI NL SE

(30) Priorität: **16.04.1993 DE 9305552**

(43) Veröffentlichungstag der Anmeldung:
19.10.1994 Patentblatt 1994/42

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(56) Entgegenhaltungen:
EP-A- 0 543 385
EP-A- 0 574 124
DE-A- 3 046 257
DE-A- 3 941 571
DE-A- 4 213 024
US-A- 5 176 077

Printed by Rank Xerox (UK) Business Services
2 14 3/3 4

Beschreibung

Die Erfindung betrifft eine Einrichtung zum Beschichten von Bedruckstoffen in Mehrfarben-Offsetdruckmaschinen mit mehreren Lackierwerken (siehe z.B. DE-A-3941571).

In der Zeitschrift FlexoDruck, 2-93, Seite 42-43, ist im Artikel "Goldlackdruck löst Metall-Bronzierung ab" angegeben, daß in einer Mehrfarben-Offsetdruckmaschine mit zwei sogenannten Lacktürmen eine Goldlackfarbe verarbeitet wurde. Dazu wurde ein Lackturm als Flexodruckwerk umgerüstet, wobei mit konventioneller Lackiertechnik eine Flexodruckplatte zum Beschichten eingesetzt wurde. Gegenüber der konventionellen Lackdosierung wurde auf die Option zur Verwendung eines Kammerrakels hingewiesen.

Ein Auftragswerk für hochviskose, ölhaltige oder niedrigviskose wasserlösliche Schichten ist aus der DE 3 906 648 A1 bekannt. Dieses Auftragswerk ist als Lackiereinrichtung, wahlweise als Offset-, Hochdruck- oder Tiefdruckwerk ausgebildet. Die Ausführungen gehen von einer strukturierten Schöpfwalze aus, die mit einem Rakelblatt korrespondierend bzw. von einer Auftragwalze und einem strukturierten Formzylinder, der mit einem Rakelblatt korrespondiert. Das Hochdruckwerk besteht dabei aus einer mit Näpfchen profilierten Schöpfwalze, der ein Rakelblatt zugeordnet ist, einer Übertragwalze, der Glättwalzen zugeordnet sind und einem Formzylinder mit Hochdruckform.

Aus der DE 4 122 990 A1 sind eine Bronze- und Effektdruckfarbe und ein Verfahren zur Herstellung eines Bronze- und Effektdruckes bekannt. Dort wird eine wasserverdünnbare Druckfarbe mit hoher Viskosität und hohem Pigmentanteil beschrieben. Diese soll aus dem Lackwerk einer Offsetmaschine oder einem Flexodruckwerk verarbeitet werden. Als Vorteil wird der kurze Verarbeitungsweg mit wenigen Farbspaltungen angegeben.

Beispielsweise aus der DE 3 614 582 A1 ist ein sogenanntes Kammerrakel zum Auftragen einer Beschichtungsmasse auf eine Beschichtungswalze bekannt. Mindestens zwei, an einer Walze anliegende, Rakelblätter bilden eine Kammer zur Aufnahme einer Masse, die unter Druck zugeführt wird.

Aufgabe der Erfindung ist es, eine Beschichtungseinrichtung der z.B. aus dem Dokument DE-A-3941571 bekannten Art weiterzuentwickeln, um auf einfache Weise eine problemlose Inline-Verarbeitung von schnellverdunstenden, wäßrigen Druckfarben/Drucklacken mit hohem Pigmentanteil bzw. groben Pigmenten kombiniert mit weiterbehandelnden Druck- oder Beschichtungsvorgängen zu ermöglichen.

Gelöst wird die Aufgabe durch die Merkmale des Hauptanspruches. Weiterbildungen ergeben sich aus den Unteransprüchen.

Die erfindungsgemäße Lösung gestattet es, das Inline-Beschichten mit höherviskosen Flüssigkeiten in einer Offsetdruckmaschine vorzunehmen unter besonderer Berücksichtigung von Lacken bzw. pigmentierten Farben auf Wasserbasis (Metallglanzdrucke). Einsatzgebiete bestehen für ausgespartes Lackieren (Spotlackierung) oder vollflächiges Lackieren. Aufgrund der geschlossenen Kammer beim Kammerrakel wird die Verdunstung der verwendeten Flüssigkeit reduziert. Dadurch wird die Verarbeitung von schnell verdunstenden, z.B. wasserlöslichen Flüssigkeiten verbessert. Die Kombination von mehreren Offsetdruckwerken und mindestens einem Flexodruckwerk kann in unterschiedlichen Anordnungen erfolgen, wobei diesen Einrichtungen in der Regel eine weitere Lackiereinrichtung, z.B. zum vollflachigen Lackieren, nachgeordnet ist.

Die Erfindung wird im Folgenden beispielhaft erläutert. Dabei zeigt

Fig. 1 eine erste Einrichtung zum Beschichten und

Fig. 2 eine Variante der Einrichtung zum Beschichten.

In Figur 1 ist eine Mehrfarben-Offsetdruckmaschine mit zwei Lackiereinrichtungen gezeigt. Die Offsetdruckmaschine (hier ohne An- und Ausleger) besteht aus fünf Druckwerken 1 bis 5, daran in Bogenlaufrichtung angeschlossen einer als Flexodruckwerk 6 ausgerüsteten Beschichtungseinrichtung und einer dieser nachgeordneten herkömmlichen Lackiereinheit 7. Dabei kann das Flexodruckwerk 6 als Spotlackiereinrichtung (für ausgespartes Lackieren) und die nachgeordnete Lackiereinheit 7 zum vollflächigen Oberflächenfinishing eingesetzt werden.

Die Flexodruckwerk 6 wie auch die Lackiereinheit 7 bestehen aus je einem Druckzylinder 8.1, 8.2, einer Transfertrommel 9.1, 9.2 und einem Formzylinder 10.1, 10.2.

In dem Flexodruckwerk 6 ist auf den Formzylinder 10.1 eine flexible Hochdruckplatte aufgespannt, zB. eine Flexodruckplatte. In Kontakt mit dem Formzylinder 10.1 ist eine Auftragwalze 11 mit strukturierter Oberfläche mit Rasternäpfchen, eine sogenannte Rasterwalze, angeordnet. An die Auftragwalze 11 anstellbar ist dieser ein Kammerrakel 12 zugeordnet. Das Kammerrakel 12 kann zB. an seiner Oberseite mittig mit einem Flüssigkeitszulauf und zwei austretenden Flüssigkeitsabläufen im Bereich der Seitenteile versehen sein. Der Flüssigkeitszulauf ist mit einer Förderpumpe, die Flüssigkeitsabläufe 11 hingegen sind mit einer Saugpumpe verbunden. Die Pumpen sind erforderlich, um speziell durch die Pigmentierung höherviskose Flüssigkeit z.B. auf Wasserbasis, wie z.B. Gold- und Silberdruckfarbe, Deckweiß oder Lack, verarbeiten zu können.

Über die Rasternäpfchen der Auftragwalze 11 wird die Beschichtungsmasse zum Einfärben der Hochdruckform auf den Formzylinder 10.1 transportiert und auf den vom Druckzylinder 8.1 zugeführten Bedruckstoff aufgebracht. Während des von der Auftragwalze 11 bewirkten Flüssigkeitstransports sorgt die Kammerrakel 12 dafür, daß die Flüssigkeit ausschließlich in den

Rasternäpfchen verbleibt.

Die Lackiereinheit 7 weist demgegenüber ein Walzenpaar zur Bildung eines Dosierspalts auf. Dabei ist eine Dosierwalze 13 an eine Auftragwalze 14 angestellt. Die Beschichtungsmasse wird direkt in den Spalt zwischen beiden Walzen eingeführt und über die Auftragwalze 14 dem Formzylinder 10.2 zugeführt. Dieser trägt sie dann am Druckzylinder 8.2 auf den zugeführten Bedruckstoff auf.

Durch die Staffelung Offsetdruck, Flexodruck und Lackieren ist speziell für Metallglanz-Beschichtungen ein besonders gutes Arbeitsergebnis erzielbar. Dabei ist die Kombination von schneller Verarbeitung der leicht verdunstenden Metalldruckfarbe bzw. des Drucklacks mit einer nachträglichen, den Glanz erhöhenden Lackbeschichtung hervorzuheben.

Ein vergleichbares System ist in Figur 2 dargestellt. Hier ist das Flexodruckwerk 6 vor dem ersten Druckwerk 1 der Offsetdruckmaschine eingesetzt. Mit einer derartigen Konfiguration lassen sich Basisbeschichtungen vor dem Drucken aufbringen, z.B. Deckweiß-Beschichtungen auf Blechmaterial, Kunststoffolie oder Karton. Die abschließende Lackierung kann weiterhin dadurch ermöglich werden, daß ein Lackierwerk 7 nach dem letzten Druckwerk 5 oder auch ein intergriertes Lackierwerk an einem konventionellen Druckwerk angeordnet ist.

Vergleichbar ist auch eine Anordnung des Flexodruckwerkes 6 innerhalb der Offsetdruckmaschine zum Aufbringen von Zwischenbeschichtungen etwa mit Trocknungsfunktion.

Patentansprüche

1. Einrichtung in einer Rotationsdruckmaschine für mehrfarbigen Offsetdruck zum Beschichten von Bedruckstoffen mit wenigstens zwei Lackiereinheiten, wobei jede Lackiereinheit einen Druckzylinder (8), einen Formzylinder (10) und eine Auftragwalze (11, 14) aufweist, und die entsprechend Bogenlaufrichtung vorgeordnete Lackiereinheit als Flexodruckwerk (6) ausgebildet ist, wobei
das Flexodruckwerk (6) aus folgenden Elementen besteht:

   dem eine Hochdruckform tragenden Formzylinder (10.1), der mit dem Druckzylinder (8.1) in Kontakt steht,
   einer Auftragwalze (11) mit Rasterstruktur, die mit dem Formzylinder (10.1) in Kontakt steht und einem anstellbaren Kammerrakel (12), das mit einer Förderpumpe zur Flüssigkeitszufuhr und einer Saugpumpe zur Flüssigkeitsrückführung verbunden ist,

   wobei
   dem Flexodruckwerk (6) eine Lackiereinheit (7) direkt oder indirekt nachgeordnet ist, und wobei in der Lackiereinheit (7) eine Auftragwalze (14) vorgesehen ist, der eine Dosierwalze (13) zur Bildung eines gemeinsamen Dosierspaltes anstellbar zugeordnet ist.

2. Einrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine zwischen den Druckwerken (1-5) angeordnet ist.

3. Einrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine den Druckwerken (1-5) vorgeordnet ist.

4. Einrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine den Druckwerken (1-5) nachgeordnet ist.

Claims

1. Device in a rotary printing press for multi-colour offset printing for coating material to be printed with at least two varnishing units, wherein each varnishing unit has an impression cylinder (8), a forme cylinder (10) and an applicator roller (11, 14), and the varnishing unit arranged upstream corresponding to the sheet running direction is constructed as a flexo print unit (6), wherein the flexo print unit (6) consists of the following elements:

   a relief forme carrying forme cylinder (10.1) which is in contact with the impression cylinder (8.1), an applicator roller (11) with a raster structure, which is in contact with the forme cylinder (10.1) and a settable-on chamber doctor (12) which is connected with a feed pump for liquid feed and a suction pump for liquid return wherein directly or indirectly arranged after the flexo print unit (6) is a varnishing unit (7) and wherein in the varnishing unit (7) an applicator roller (14) is provided relative to which a metering roller (13) is arranged to form a common metering slot.

2. Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press between the printing units (1-5).

3. Device according to Claim 1, characterised in that the flexo print unit (6) is arranged in an offset printing press prior to the printing units (1-5).

4. Device according to Claim 1, characterized in that the flexo print unit (6) is arranged in an offset printing press subsequent to the printing units (1-5).

Revendications

1. Dispositif, dans une machine d'impression rotative pour une impression offset polychrome, pour revêtir des matières d'impression, comportant au moins deux unités de laquage, chaque unité de laquage présentant un cylindre d'impression (8), un cylindre gravé (10), et un rouleau d'application (11,14), et l'unité de laquage en amont dans le sens d'avance des feuilles étant réalisée comme unité d'impression flexographique (6), l'unité d'impression flexographique (6) étant constituée des éléments suivants :

   - le cylindre gravé (10.1) portant une forme typographique, qui est en contact avec le cylindre d'impression (8.1),
   - un rouleau d'application (11) ayant une structure de trame, qui est en contact avec le cylindre gravé (10.1) et une racle à chambre réglable (12), qui est reliée à une pompe d'alimentation pour amener du liquide et à une pompe d'aspiration pour le retour du liquide,

   une unité de laquage (7) étant agencée directement ou indirectement en aval de l'unité d'impression flexographique (6), et un rouleau d'application (14) étant prévu dans l'unité de laquage (7), auquel est associé, de façon réglable, un rouleau de dosage (13) pour former une fente de dosage commune.

2. Dispositif selon la revendication 1, caractérisé en ce que l'unité d'impression flexographique (6), dans une machine d'impression offset, est agencée entre les unités d'impression (1-5).

3. Dispositif selon la revendication 1, caractérisé en ce que l'unité d'impression flexographique (6), dans une machine d'impression offset, est agencée en amont des unités d'impression (1-5).

4. Dispositif selon la revendication 1, caractérisé en ce que l'unité d'impression flexographique (6), dans une machine d'impression offset, est agencée en aval des unités d'impression (1-5).

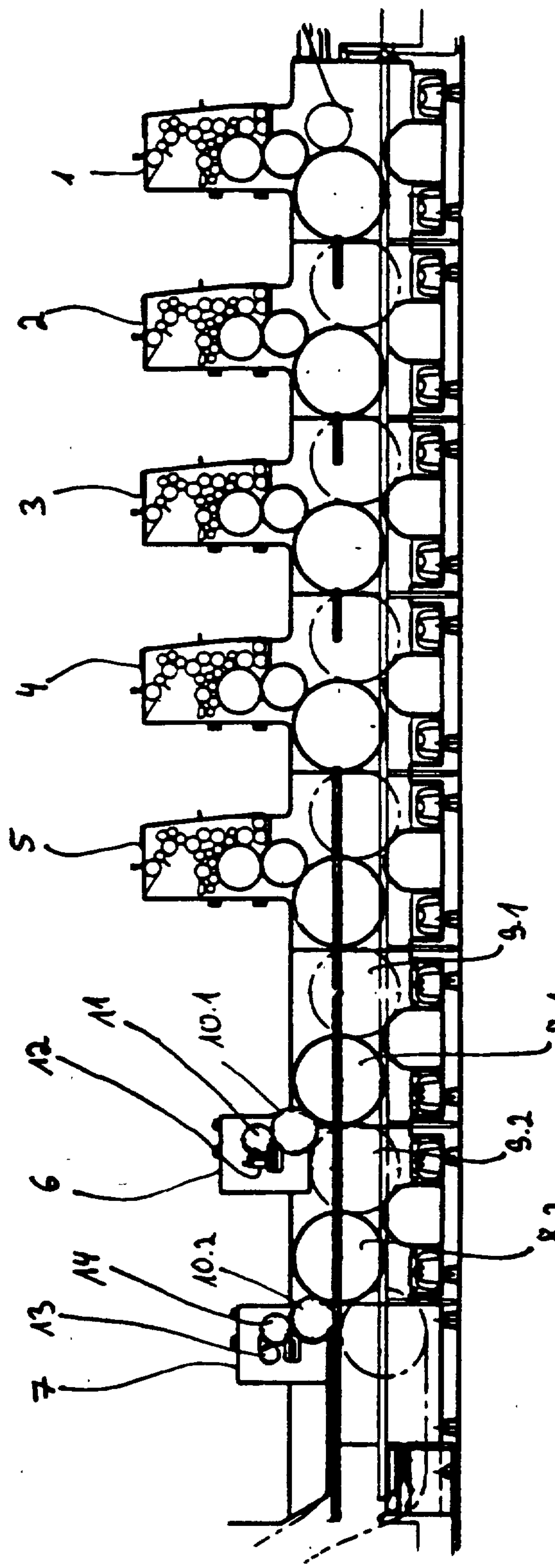

Fig. 1

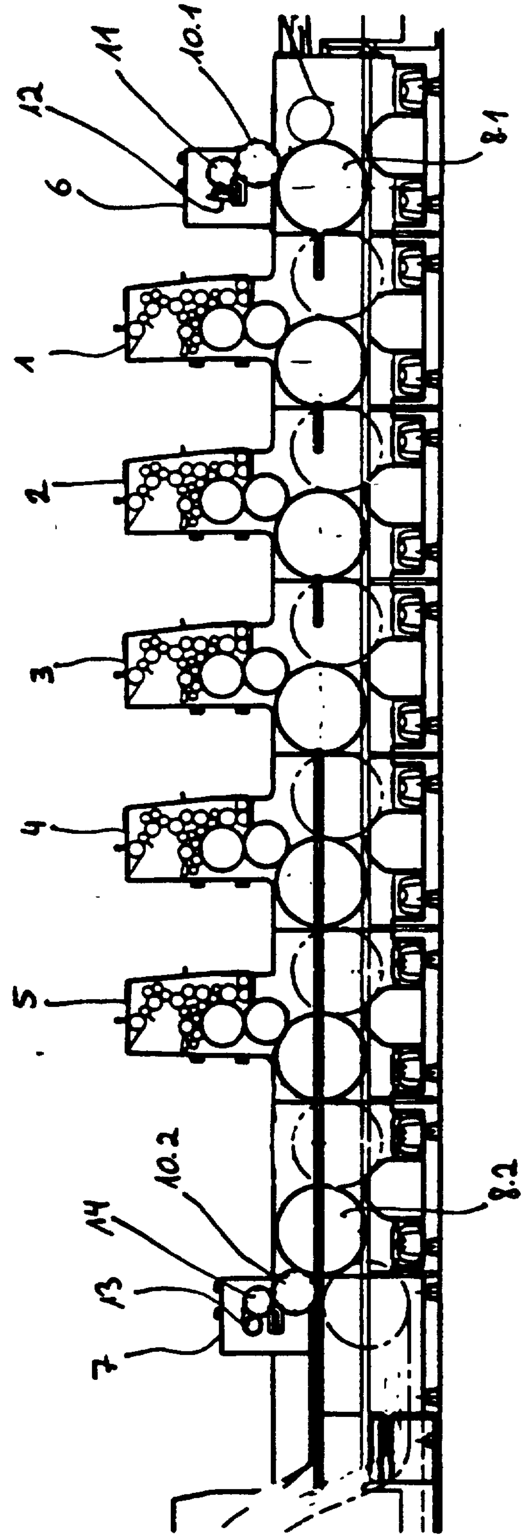

Fig. 2

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

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(12) **Disclosure notice**
(10) **DE 41 22 990 A1**

(51) Intern. Classification^5:
C 09 D 11/02
B 41M 3/00
// C09D 5/38, 5/36, 17/00, 101/26, 189/00, 171/02, 125/04, 133/04, 191/06, B41G 1/00

(21) File number: P 41 22 990.8
(22) Application date: July 11th 1991
(43) Disclosure date: January 14th 1993

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Application for examination pursuant to § 44 Patent act has been filed.

(54) Bronze or effect printing ink and method for bronze or effect printing.

(57) The invention relates to a bronze or effect printing ink, which can be diluted in water and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup. The invention's printing ink is especially suited to be processed from the coating unit of an offset machine and/or coating machine.

Description

The invention relates to a water-dilutable bronze or effect printing ink.
The invention further relates to a method for bronze or effect printing.
In the production of high-quality packaging it is often necessary for creative reasons to carry out machine bronzing to achieve a brilliant gold effect. Such a gold effect can not be achieved using conventional offset gold printing inks.
For environmental, workplace health, and cost savings reasons one strives to develop printing inks, which release only very small solvent quantities during drying. Ink systems that can be diluted in water have been found to be well-suited for this purpose.
DE-OS 28 39 501 describes a gold bronze printing ink in the form of a sol, consisting of a binding agent with a synthetic resin lacquer, a gel lacquer, a China wood oil lacquer, or of an petroleum based solvent and an amine, and of a gold bronzing powder of an aluminum-containing brass alloy present in the form of fine platelets carrying a fatty acid-surface film, as well as the usual admixtures and supplementary agents. But this ink is not a water-dilutable gold bronze printing ink.
The state of the art in machine bronzing still has the following grave disadvantages:

- Until now a gold underprinting ink had to be printed in a separate processing step.
- The print obtained in this manner is not odorless, which is a drawback, especially in food or cigarette packaging.
- Gold bronzing powder must be applied in an additional, subsequent processing step. Hereby, the excess powder that does not adhere to the gold underprinting ink must be removed by a plush roller.
- Often it is not possible to completely remove the metal powder from the printed surfaces (dusting), which must be seen as a quality defect. The dusting is often a cause of problems, as is the operation at slow machine speeds, which must also be seen as a disadvantage.
- The spent bronze powder has to be reconditioned and must be proportionally added to fresh powder.
- In addition, the work area is contaminated by airborne bronze dust, which can lead to an increased consumption of bronze powder and to adverse health effects.
- Finally, a necessary third separate processing step is necessary for a top coating to fix the bronze particles.

Thus the object of the invention is to provide a bronze or effect printing ink as well as a method for bronze or effect printing, which would overcome these drawbacks. The following conditions must be fulfilled to solve this object.

1. A binding agent must be formulated that on one hand is water-dilutable, and on the other hand does not corrode brass powder. From the state of the art one knows of the use of alkaline completely saponified resin solutions and ammoniacal dispersions as exclusive binding agents, but these are unsuitable, as they corrode the bronze particles and are unstable.
2. A suitable bronze quality must be found with regard to the metallic effect and the distribution of particle sizes.
3. An application process for such a novel ink must be found.

In water-dilutable systems with metal pigments these requirements can not be met by single-component printing inks, due to a lack of stabilization.
The object is solved by the invention through a printing ink, which is water-dilutable, consists of two components, and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup, whereby it preferably contains 55 to 70% by weight of a component A, and 30 to 45% by weight of a component B. Especially preferred is a printing ink, in which the component A comprises 80 – 100% by weight of a binder system, and 0 to 20% by weight of one or several wax components.
In an embodiment the binder system contains:
0-15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
60-100% by weight styrene- or acrylate dispersions/solutions, in which 35 to 50% by weight is solids, and
0-15% by weight of one or several glycols.
In special embodiments, the styrenes and/or acrylates have a molar weight spectrum between 100,000 to 10,000,000, and ethyl diglycol, ethanediol, or 1,2-propylene glycol are used as glycol.
In a further special embodiment, the employed wax component is a wax on the basis of carnauba-, polyethylene-, or polytetrafluoroethylene wax. Especially preferred is a printing ink, in which the component B contains bronze and or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum-formed platelets and/or one or several color pigments.
The metallic effect of the printed ink is highly independent of the quality of the brass or aluminum powder. Here in particular the particle size distribution is of importance. In addition, one requires a good transfer behavior of the ink in the printing press
The following single and double polish bronze powders were found to be suitable:
Bleichgold[1] (3-20 µm),
Reichgold (3-20 µm),
Reichbleichgold (3-20 µm),
Reichbleichgold (3-20 µm) pasted in methoxy propanol,
Aluminum (3-20 µm) pasted in methoxy propanol
In addition to bronze powder, aluminum powder, nacreous pigments such as Iriodine®, Iriobronzen®, high-vacuum- or hydrothermally formed platelets, such as Metalure®, Dekomet®, Paliocrom®, and color pigments can be employed in the same fashion

[1] Reichgold, Bleichgold, Reichbleichgold = Rich Gold, Pale Gold, Rich Pale Gold, respectively. (The Translator)

The invention's two-component printing ink meets the requirements very well

In the binder system of component A, cellulose ether, collagen, and polyethylene glycol serve as thickening agents and transfer aids in the printing process Rewopal PEG 6000 PS has been shown to be an especially preferable polyethylene glycol

The pH value of the styrene- and acrylate dispersions/solutions usually is between 7.0 and 9.0. Suitable styrene- and/or acrylate dispersions or solutions are Zinpol 132® and Zinpol 146®

The glycols employed in the binder system serve as film forming aids and/or drying retarding agents.

To manufacture the invention's two-component ink, at first component A is produced by mixing together a binder system and one or several wax components. The waxes aid in controlling the smoothness and rub resistance of the print. Component B preferably is bronze in paste form, i e. pasted metal powder. To complete the print-ready ink these are then slowly mixed into the binding agent. If necessary, additional common admixtures can be added to the binder system or the printing ink.

The flow time of the printed ink is between 60 and 180 seconds, measured in a flow cup according to DIN 53 211/4. Preferred is a flow time between 60 and 120 seconds, in particular preferred is a flow time between 80 and 120 seconds.

As already mentioned, metal pigments are not suitable for water-dilutable single-component printing inks due to a lack in stability. If no metal pigments are used, a corresponding single-component printing ink will be stable.

Thus, a further embodiment of the invention comprises an effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds in a DIN 53 211/4 flow cup, and containing:

a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50 % by weight,
c) 0 – 15 % by weight one or several glycols,
d) 0 – 20% by weight one or several wax components,
e) 2 – 45 % by weight one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

The styrenes and/or acrylates, glycols, wax components, nacreous pigments, high-vacuum-formed platelets, and color pigments are the same as for the two-component ink.

A suitable process for application of the invention's printing ink was found to be the processing out of a coating unit of an offset machine and/or coating machine, or out of a flexo printing unit.

This is due to the distance between the ink reservoir (lacquer tank) and the material to be printed being short in this particular case, which reduces ink separation. Especially advantageous is the application by a direct-acting coating application system in sheet-fed offset machines. The form cylinder can be operated with a blanket or with polymer printing plates of the type APR, Napp, Cyrel, Nyloflex, or Nyloprint, or with printing plates with self-adhesive polymer sheets.

The invention is explained with the help of examples.

Examples 1 to 3 and 6 to 10

We printed on a Heidelberger-Speedmaster sheet-fed offset machine that was equipped with a Cyrel-plate with underlay blanket (green, 2mm) and a type 75 anilox roller (ink cell depth 30 μm).

Example 1

The printing ink had the following composition:

8.25 kg Zinpol 146®
0.75 kg water
6.00 kg *Reichbleichgold* (8μm) (90%)

This corresponds to a water content of 5%, a pigment paste content of 40% and a pigment content of 36%.

Example 2

The printing ink had the following composition:

11.00 kg Zinpol 146®
3.00 kg water
8.00 kg bronze (8μm) (90%)

This corresponds to a water content of 13.6%, a pigment paste content of 36%, and a pigment content of 33%.

Example 3

The printing ink had the following composition:

9.60 kg Zinpol 146®
7.00 kg *Reichbleichgold* paste (8μm) (90%)
0.70 kg propylene glycol (retarding agent)
0.70 kg water

This corresponds to a water content of 4%, a retarding agent content of 4%, a pigment paste content of 38.8%, and a pigment content of 35.0%.

In all three of examples 1 to 3, the print was good to excellent, and the gold effect was acceptable

Examples 4 and 5

These were implemented like examples 1 to 3, but the anilox roller was replaced by a chromium roller.

Example 4

The printing ink had a composition identical to that of the ink of example 3.

Example 5

The printing ink had the following composition:

9.625 kg Zinpol 146®
7.000 kg *Reichbleichgold* (8μm) (90%)
0 950 kg water
1.700 kg propylene glycol

This corresponds to a water content of 4 9%, a retarding agent content of 8.8%, a pigment paste content of 36%, and a pigment content of 33%. The exposure times of the photo polymer plate were varied (22 sec to 28 sec). The best result was achieved by a photo polymer plate with an exposure time of 28 sec.

In examples 4 and 5, the print was good to excellent, and the gold effect was good to excellent as well.

Example 6

The printing ink had the following composition:
5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodin 153®

Example 7

5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodine 300®

Example 8

9 3 kg Zinpol 146®
0.4 kg propylene glycol
0 3 kg Metalure Type L 55350 AE®

Example 9

7.4 kg Zinpol 126®
0.5 kg propylene glycol
2.1 kg Fanalblau D 6390®

Example 10

9.0 kg Zinpol 146®
0 2 kg propylene glycol
0.3 kg Metalure L 55350 AE®
0.4 kg Irgalith yellow LBIW®
0.2 kg Irgalith orange F2G®
In examples 6 to 10, the print was good to excellent, and the color effect was good to excellent as well.
Using the invention's printing ink and method it is now possible to achieve a metal effect comparable to that of state of the art bronzing, with smooth, solid printing of areas or open print of reverse types. Moreover, this bronze effect can now be achieved in an online-process

Patent claims

1. Bronze or effect printing ink characterized by being water-dilutable, consisting of two components, and having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup.

2. Printing ink of claim 1 containing
55 – 70% by weight of a first component A and
30 – 45% by weight of a second component B.

3 Printing ink of claim 2 wherein
80 – 100% by weight of component A is a binder system and 0 – 20% by weight are one or several wax components.

4 Printing ink of claim 3 wherein
the binder system contains
0-15 % by weight cellulose ether and/or collagen and/or polyethylene glycol,
60 – 100% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight, and
0 – 15% by weight one or several glycols.

5 Effect printing ink characterized by
being water-dilutable, having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup, and containing:
a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight
c) 0 – 15% by weight one or several glycols
d) 0 – 20% by weight one or several wax components
e) 2 – 45 % one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

6. Printing ink of claim 4 or 5 wherein
the styrenes or acrylates have a molar weight range between 100,000 and 10,000,000.

7. Printing ink of claim 4 or 5 wherein
the employed glycol is ethyl diglycol, ethanediol, or 1,2-propylene glycol

8. Printing ink of one of claims 3 to 7 wherein
the wax component is based on carnauba-, polyethylene-, or polytetrafluoroethylene wax.

9. Printing ink of one of claims 2, 3, 4, 6, 7, or 8 wherein
component B contains bronze and/or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

10. Printing ink of claim 9 wherein
the employed bronze is *Bleichgold*, *Reichgold*, or *Reichbleichgold*.

11. Printing ink of claim 5 or 9 wherein
the employed nacreous pigments are Iriodine® and/or Iriobronzen®, and the employed high-vacuum-formed platelets are Metalure® and/or Dekomet® and/or Palicrom®.

12. Method for bronze or effect printing, wherein
a printing ink of one of claims 1 to 11 is processed out of the coating unit of an offset machine and/or coating machine, or out of a flexo printing unit

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September 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

DE 41 22 990 A1

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(12) **Disclosure notice**
(10) **DE 41 22 990 A1**

(51) Intern. Classification^5:
C 09 D 11/02
B 41M 3/00
// C09D 5/38, 5/36, 17/00, 101/26, 189/00, 171/02, 125/04, 133/04, 191/06, B41G 1/00

(21) File number: P 41 22 990.8
(22) Application date: July 11th 1991
(43) Disclosure date: January 14th 1993

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The invention further relates to a method for bronze or effect printing.

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For environmental, workplace health, and cost savings reasons one strives to develop printing inks, which release only very small solvent quantities during drying. Ink systems that can be diluted in water have been found to be well-suited for this purpose.

DE-OS 28 39 501 describes a gold bronze printing ink in the form of a sol, consisting of a binding agent with a synthetic resin lacquer, a gel lacquer, a China wood oil lacquer, or of an petroleum based solvent and an amine, and of a gold bronzing powder of an aluminum-containing brass alloy present in the form of fine platelets carrying a fatty acid-surface film, as well as the usual admixtures and supplementary agents. But this ink is not a water-dilutable gold bronze printing ink.

The state of the art in machine bronzing still has the following grave disadvantages:

- Until now a gold underprinting ink had to be printed in a separate processing step.
- The print obtained in this manner is not odorless, which is a drawback, especially in food or cigarette packaging.
- Gold bronzing powder must be applied in an additional, subsequent processing step. Hereby, the excess powder that does not adhere to the gold underprinting ink must be removed by a plush roller.
- Often it is not possible to completely remove the metal powder from the printed surfaces (dusting), which must be seen as a quality defect. The dusting is often a cause of problems, as is the operation at slow machine speeds, which must also be seen as a disadvantage.
- The spent bronze powder has to be reconditioned and must be proportionally added to fresh powder.
- In addition, the work area is contaminated by airborne bronze dust, which can lead to an increased consumption of bronze powder and to adverse health effects.
- Finally, a necessary third separate processing step is necessary for a top coating to fix the bronze particles.

Thus the object of the invention is to provide a bronze or effect printing ink as well as a method for bronze or effect printing, which would overcome these drawbacks. The following conditions must be fulfilled to solve this object.

1. A binding agent must be formulated that on one hand is water-dilutable, and on the other hand does not corrode brass powder. From the state of the art one knows of the use of alkaline completely saponified resin solutions and ammoniacal dispersions as exclusive binding agents, but these are unsuitable, as they corrode the bronze particles and are unstable.
2. A suitable bronze quality must be found with regard to the metallic effect and the distribution of particle sizes.
3. An application process for such a novel ink must be found.

In water-dilutable systems with metal pigments these requirements can not be met by single-component printing inks, due to a lack of stabilization.

The object is solved by the invention through a printing ink, which is water-dilutable, consists of two components, and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup, whereby it preferably contains 55 to 70% by weight of a component A, and 30 to 45% by weight of a component B. Especially preferred is a printing ink, in which the component A comprises 80 – 100% by weight of a binder system, and 0 to 20% by weight of one or several wax components.

In an embodiment the binder system contains
0-15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
60-100% by weight styrene- or acrylate dispersions/solutions, in which 35 to 50% by weight is solids, and
0-15% by weight of one or several glycols.

In special embodiments, the styrenes and/or acrylates have a molar weight spectrum between 100,000 to 10,000,000, and ethyl diglycol, ethanediol, or 1,2-propylene glycol are used as glycol.

In a further special embodiment, the employed wax component is a wax on the basis of carnauba-, polyethylene-, or polytetrafluoroethylene wax. Especially preferred is a printing ink, in which the component B contains bronze and or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum-formed platelets and/or one or several color pigments.

The metallic effect of the printed ink is highly independent of the quality of the brass or aluminum powder. Here in particular the particle size distribution is of importance. In addition, one requires a good transfer behavior of the ink in the printing press.

The following single and double polish bronze powders were found to be suitable:
Bleichgold[1] (3-20 µm),
Reichgold (3-20 µm),
Reichbleichgold (3-20 µm),
Reichbleichgold (3-20 µm) pasted in methoxy propanol,
Aluminum (3-20 µm) pasted in methoxy propanol

In addition to bronze powder, aluminum powder, nacreous pigments such as Iriodine®, Iriobronzen®, high-vacuum- or hydrothermally formed platelets, such as Metalure®, Dekomet®, Paliocrom®, and color pigments can be employed in the same fashion.

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[1] Reichgold, Bleichgold, Reichbleichgold = Rich Gold, Pale Gold, Rich Pale Gold, respectively. (The Translator)

The invention's two-component printing ink meets the requirements very well

In the binder system of component A. cellulose ether, collagen, and polyethylene glycol serve as thickening agents and transfer aids in the printing process Rewopal PEG 6000 PS has been shown to be an especially preferable polyethylene glycol

The pH value of the styrene- and acrylate dispersions/solutions usually is between 7.0 and 9 0. Suitable styrene- and/or acrylate dispersions or solutions are Zinpol 132® and Zinpol 146®

The glycols employed in the binder system serve as film forming aids and/or drying retarding agents.

To manufacture the invention's two-component ink, at first component A is produced by mixing together a binder system and one or several wax components The waxes aid in controlling the smoothness and rub resistance of the print Component B preferably is bronze in paste form, i.e pasted metal powder To complete the print-ready ink these are then slowly mixed into the binding agent If necessary, additional common admixtures can be added to the binder system or the printing ink.

The flow time of the printed ink is between 60 and 180 seconds, measured in a flow cup according to DIN 53 211/4. Preferred is a flow time between 60 and 120 seconds, in particular preferred is a flow time between 80 and 120 seconds.

As already mentioned, metal pigments are not suitable for water-dilutable single-component printing inks due to a lack in stability If no metal pigments are used, a corresponding single-component printing ink will be stable.

Thus, a further embodiment of the invention comprises an effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds in a DIN 53 211/4 flow cup, and containing

a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50 % by weight,
c) 0 – 15 % by weight one or several glycols,
d) 0 – 20% by weight one or several wax components,
e) 2 – 45 % by weight one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

The styrenes and/or acrylates, glycols, wax components, nacreous pigments, high-vacuum-formed platelets, and color pigments are the same as for the two-component ink.

A suitable process for application of the invention's printing ink was found to be the processing out of a coating unit of an offset machine and/or coating machine, or out of a flexo printing unit

This is due to the distance between the ink reservoir (lacquer tank) and the material to be printed being short in this particular case, which reduces ink separation Especially advantageous is the application by a direct-acting coating application system in sheet-fed offset machines. The form cylinder can be operated with a blanket or with polymer printing plates of the type APR, Napp, Cyrel, Nyloflex, or Nyloprint, or with printing plates with self-adhesive polymer sheets

The invention is explained with the help of examples

Examples 1 to 3 and 6 to 10

We printed on a Heidelberger-Speedmaster sheet-fed offset machine that was equipped with a Cyrel-plate with underlay blanket (green, 2mm) and a type 75 anilox roller (ink cell depth 30 μm).

Example 1

The printing ink had the following composition.
8 25 kg Zinpol 146®
0.75 kg water
6.00 kg *Reichbleichgold* (8μm) (90%)
This corresponds to a water content of 5%, a pigment paste content of 40% and a pigment content of 36%.

Example 2

The printing ink had the following composition.
11.00 kg Zinpol 146®
3 00 kg water
8.00 kg bronze (8μm) (90%)
This corresponds to a water content of 13 6%, a pigment paste content of 36%, and a pigment content of 33%

Example 3

The printing ink had the following composition.
9.60 kg Zinpol 146®
7.00 kg *Reichbleichgold* paste (8μm) (90%)
0 70 kg propylene glycol (retarding agent)
0.70 kg water
This corresponds to a water content of 4%, a retarding agent content of 4%, a pigment paste content of 38 8%, and a pigment content of 35 0%.

In all three of examples 1 to 3, the print was good to excellent, and the gold effect was acceptable.

Examples 4 and 5

These were implemented like examples 1 to 3, but the anilox roller was replaced by a chromium roller.

Example 4

The printing ink had a composition identical to that of the ink of example 3

Example 5

The printing ink had the following composition
9 625 kg Zinpol 146®
7.000 kg *Reichbleichgold* (8μm) (90%)
0.950 kg water
1 700 kg propylene glycol
This corresponds to a water content of 4.9%, a retarding agent content of 8 8%, a pigment paste content of 36%, and a pigment content of 33%. The exposure times of the photo polymer plate were varied (22 sec to 28 sec). The best result was achieved by a photo polymer plate with an exposure time of 28 sec

In examples 4 and 5, the print was good to excellent, and the gold effect was good to excellent as well

Example 6

The printing ink had the following composition.
5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodin 153®

Example 7

5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodine 300®

Example 8

9 3 kg Zinpol 146®
0 4 kg propylene glycol
0 3 kg Metalure Type L 55350 AE®

Example 9

7 4 kg Zinpol 126®
0 5 kg propylene glycol
2.1 kg Fanalblau D 6390®

Example 10

9.0 kg Zinpol 146®
0 2 kg propylene glycol
0.3 kg Metalure L 55350 AE®
0.4 kg Irgalith yellow LBIW®
0.2 kg Irgalith orange F2G®

In examples 6 to 10, the print was good to excellent, and the color effect was good to excellent as well.
Using the invention's printing ink and method it is now possible to achieve a metal effect comparable to that of state of the art bronzing, with smooth, solid printing of areas or open print of reverse types Moreover, this bronze effect can now be achieved in an online-process

Patent claims

1. Bronze or effect printing ink characterized by being water-dilutable, consisting of two components, and having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup.

2 Printing ink of claim 1 containing
55 – 70% by weight of a first component A and
30 – 45% by weight of a second component B

3 Printing ink of claim 2 wherein
80 – 100% by weight of component A is a binder system and 0 – 20% by weight are one or several wax components

4 Printing ink of claim 3 wherein
the binder system contains
0-15 % by weight cellulose ether and/or collagen and/or polyethylene glycol,
60 – 100% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight, and
0 – 15% by weight one or several glycols.

5 Effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup, and containing
a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight
c) 0 – 15% by weight one or several glycols
d) 0 – 20% by weight one or several wax components
e) 2 – 45 % one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

6. Printing ink of claim 4 or 5 wherein
the styrenes or acrylates have a molar weight range between 100,000 and 10,000,000

7 Printing ink of claim 4 or 5 wherein
the employed glycol is ethyl diglycol, ethanediol, or 1,2-propylene glycol.

8 Printing ink of one of claims 3 to 7 wherein
the wax component is based on carnauba-, polyethylene-, or polytetrafluoroethylene wax

9 Printing ink of one of claims 2, 3, 4, 6, 7, or 8 wherein
component B contains bronze and/or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

10. Printing ink of claim 9 wherein
the employed bronze is *Bleichgold, Reichgold*, or *Reichbleichgold.*

11 Printing ink of claim 5 or 9 wherein
the employed nacreous pigments are Iriodine® and/or Iriobronzen®, and the employed high-vacuum-formed platelets are Metalure® and/or Dekomet® and/or Palicrom®

12. Method for bronze or effect printing, wherein
a printing ink of one of claims 1 to 11 is processed out of the coating unit of an offset machine and/or coating machine, or out of a flexo printing unit

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I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

DE 41 22 990 A1

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(19) **Federal Republic of Germany**
German patent office

(12) **Disclosure notice**
(10) **DE 41 22 990 A1**

(51) Intern. Classification[5]:
C 09 D 11/02
B 41M 3/00
// C09D 5/38, 5/36, 17/00, 101/26, 189/00, 171/02, 125/04, 133/04, 191/06, B41G 1/00

(21) File number: P 41 22 990.8
(22) Application date: July 11^{th} 1991
(43) Disclosure date: January 14^{th} 1993

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Application for examination pursuant to § 44 Patent act has been filed.

(54) Bronze or effect printing ink and method for bronze or effect printing.

(57) The invention relates to a bronze or effect printing ink, which can be diluted in water and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup. The invention's printing ink is especially suited to be processed from the coating unit of an offset machine and/or coating machine.

Description

The invention relates to a water-dilutable bronze or effect printing ink.

The invention further relates to a method for bronze or effect printing.

In the production of high-quality packaging it is often necessary for creative reasons to carry out machine bronzing to achieve a brilliant gold effect. Such a gold effect can not be achieved using conventional offset gold printing inks.

For environmental, workplace health, and cost savings reasons one strives to develop printing inks, which release only very small solvent quantities during drying. Ink systems that can be diluted in water have been found to be well-suited for this purpose.

DE-OS 28 39 501 describes a gold bronze printing ink in the form of a sol, consisting of a binding agent with a synthetic resin lacquer, a gel lacquer, a China wood oil lacquer, or of an petroleum based solvent and an amine, and of a gold bronzing powder of an aluminum-containing brass alloy present in the form of fine platelets carrying a fatty acid-surface film, as well as the usual admixtures and supplementary agents. But this ink is not a water-dilutable gold bronze printing ink.

The state of the art in machine bronzing still has the following grave disadvantages:

- Until now a gold underprinting ink had to be printed in a separate processing step.
- The print obtained in this manner is not odorless, which is a drawback, especially in food or cigarette packaging.
- Gold bronzing powder must be applied in an additional, subsequent processing step Hereby, the excess powder that does not adhere to the gold underprinting ink must be removed by a plush roller.
- Often it is not possible to completely remove the metal powder from the printed surfaces (dusting), which must be seen as a quality defect. The dusting is often a cause of problems, as is the operation at slow machine speeds, which must also be seen as a disadvantage.
- The spent bronze powder has to be reconditioned and must be proportionally added to fresh powder.
- In addition, the work area is contaminated by airborne bronze dust, which can lead to an increased consumption of bronze powder and to adverse health effects.
- Finally, a necessary third separate processing step is necessary for a top coating to fix the bronze particles.

Thus the object of the invention is to provide a bronze or effect printing ink as well as a method for bronze or effect printing, which would overcome these drawbacks. The following conditions must be fulfilled to solve this object:

1. A binding agent must be formulated that on one hand is water-dilutable, and on the other hand does not corrode brass powder. From the state of the art one knows of the use of alkaline completely saponified resin solutions and ammoniacal dispersions as exclusive binding agents, but these are unsuitable, as they corrode the bronze particles and are unstable.
2. A suitable bronze quality must be found with regard to the metallic effect and the distribution of particle sizes.
3. An application process for such a novel ink must be found.

In water-dilutable systems with metal pigments these requirements can not be met by single-component printing inks, due to a lack of stabilization.

The object is solved by the invention through a printing ink, which is water-dilutable, consists of two components, and possesses a flow time of longer than 60 seconds from a DIN 53211/4 flow cup, whereby it preferably contains 55 to 70% by weight of a component A, and 30 to 45% by weight of a component B. Especially preferred is a printing ink, in which the component A comprises 80 – 100% by weight of a binder system, and 0 to 20% by weight of one or several wax components.

In an embodiment the binder system contains:

0-15% by weight cellulose ether and/or collagen and/or polyethylene glycol,

60-100% by weight styrene- or acrylate dispersions/solutions, in which 35 to 50% by weight is solids, and

0-15% by weight of one or several glycols.

In special embodiments, the styrenes and/or acrylates have a molar weight spectrum between 100,000 to 10,000,000, and ethyl diglycol, ethanediol, or 1,2-propylene glycol are used as glycol.

In a further special embodiment, the employed wax component is a wax on the basis of carnauba-, polyethylene-, or polytetrafluoroethylene wax. Especially preferred is a printing ink, in which the component B contains bronze and or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum-formed platelets and/or one or several color pigments.

The metallic effect of the printed ink is highly independent of the quality of the brass or aluminum powder. Here in particular the particle size distribution is of importance. In addition, one requires a good transfer behavior of the ink in the printing press.

The following single and double polish bronze powders were found to be suitable:

Bleichgold[1] (3-20 µm),

Reichgold (3-20 µm),

Reichbleichgold (3-20 µm),

Reichbleichgold (3-20 µm) pasted in methoxy propanol,

Aluminum (3-20 µm) pasted in methoxy propanol.

In addition to bronze powder, aluminum powder, nacreous pigments such as Iriodine®, Iriobronzen®, high-vacuum- or hydrothermally formed platelets, such as Metalure®, Dekomet®, Paliocrom®, and color pigments can be employed in the same fashion.

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[1] Reichgold, Bleichgold, Reichbleichgold = Rich Gold, Pale Gold, Rich Pale Gold, respectively. (The Translator)

The invention's two-component printing ink meets the requirements very well.

In the binder system of component A, cellulose ether, collagen, and polyethylene glycol serve as thickening agents and transfer aids in the printing process. Rewopal PEG 6000 PS has been shown to be an especially preferable polyethylene glycol.

The pH value of the styrene- and acrylate dispersions/solutions usually is between 7 0 and 9.0. Suitable styrene- and/or acrylate dispersions or solutions are Zinpol 132® and Zinpol 146®

The glycols employed in the binder system serve as film forming aids and/or drying retarding agents.

To manufacture the invention's two-component ink, at first component A is produced by mixing together a binder system and one or several wax components. The waxes aid in controlling the smoothness and rub resistance of the print. Component B preferably is bronze in paste form, i.e. pasted metal powder. To complete the print-ready ink these are then slowly mixed into the binding agent. If necessary, additional common admixtures can be added to the binder system or the printing ink.

The flow time of the printed ink is between 60 and 180 seconds, measured in a flow cup according to DIN 53 211/4. Preferred is a flow time between 60 and 120 seconds, in particular preferred is a flow time between 80 and 120 seconds.

As already mentioned, metal pigments are not suitable for water-dilutable single-component printing inks due to a lack in stability. If no metal pigments are used, a corresponding single-component printing ink will be stable.

Thus, a further embodiment of the invention comprises an effect printing ink characterized by being water-dilutable, having a flow time of longer than 60 seconds in a DIN 53 211/4 flow cup, and containing:

a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50 % by weight,
c) 0 – 15 % by weight one or several glycols,
d) 0 – 20% by weight one or several wax components,
e) 2 – 45 % by weight one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.

The styrenes and/or acrylates, glycols, wax components, nacreous pigments, high-vacuum-formed platelets, and color pigments are the same as for the two-component ink.

A suitable process for application of the invention's printing ink was found to be the processing out of a coating unit of an offset machine and/or coating machine, or out of a flexo printing unit.

This is due to the distance between the ink reservoir (lacquer tank) and the material to be printed being short in this particular case, which reduces ink separation Especially advantageous is the application by a direct-acting coating application system in sheet-fed offset machines. The form cylinder can be operated with a blanket or with polymer printing plates of the type APR, Napp, Cyrel, Nyloflex, or Nyloprint, or with printing plates with self-adhesive polymer sheets.

The invention is explained with the help of examples.

Examples 1 to 3 and 6 to 10

We printed on a Heidelberger-Speedmaster sheet-fed offset machine that was equipped with a Cyrel-plate with underlay blanket (green, 2mm) and a type 75 anilox roller (ink cell depth 30 µm).

Example 1

The printing ink had the following composition:
8.25 kg Zinpol 146®
0.75 kg water
6.00 kg *Reichbleichgold* (8µm) (90%)
This corresponds to a water content of 5%, a pigment paste content of 40% and a pigment content of 36%.

Example 2

The printing ink had the following composition:
11.00 kg Zinpol 146®
3.00 kg water
8 00 kg bronze (8µm) (90%)
This corresponds to a water content of 13.6%, a pigment paste content of 36%, and a pigment content of 33%.

Example 3

The printing ink had the following composition:
9.60 kg Zinpol 146®
7.00 kg *Reichbleichgold* paste (8µm) (90%)
0.70 kg propylene glycol (retarding agent)
0.70 kg water
This corresponds to a water content of 4%, a retarding agent content of 4%, a pigment paste content of 38.8%, and a pigment content of 35.0%.

In all three of examples 1 to 3, the print was good to excellent, and the gold effect was acceptable.

Examples 4 and 5

These were implemented like examples 1 to 3, but the anilox roller was replaced by a chromium roller

Example 4

The printing ink had a composition identical to that of the ink of example 3.

Example 5

The printing ink had the following composition.
9.625 kg Zinpol 146®
7.000 kg *Reichbleichgold* (8µm) (90%)
0.950 kg water
1.700 kg propylene glycol
This corresponds to a water content of 4.9%, a retarding agent content of 8.8%, a pigment paste content of 36%, and a pigment content of 33%. The exposure times of the photo polymer plate were varied (22 sec to 28 sec). The best result was achieved by a photo polymer plate with an exposure time of 28 sec.

In examples 4 and 5, the print was good to excellent, and the gold effect was good to excellent as well.

Example 6

The printing ink had the following composition:
5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodin 153®

Example 7

5 kg Zinpol 146®
1 kg propylene glycol
4 kg Iriodine 300®

Example 8

9 3 kg Zinpol 146®
0.4 kg propylene glycol
0.3 kg Metalure Type L 55350 AE®

Example 9

7.4 kg Zinpol 126®
0.5 kg propylene glycol
2.1 kg Fanalblau D 6390®

Example 10

9.0 kg Zinpol 146®
0.2 kg propylene glycol
0.3 kg Metalure L 55350 AE®
0.4 kg Irgalith yellow LBIW®
0.2 kg Irgalith orange F2G®

In examples 6 to 10, the print was good to excellent, and the color effect was good to excellent as well.

Using the invention's printing ink and method it is now possible to achieve a metal effect comparable to that of state of the art bronzing, with smooth, solid printing of areas or open print of reverse types. Moreover, this bronze effect can now be achieved in an online-process.

Patent claims

1. Bronze or effect printing ink characterized by being water-dilutable, consisting of two components, and having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup.
2. Printing ink of claim 1 containing
55 – 70% by weight of a first component A and
30 – 45% by weight of a second component B.
3. Printing ink of claim 2 wherein
80 – 100% by weight of component A is a binder system and 0 – 20% by weight are one or several wax components.

4. Printing ink of claim 3 wherein
the binder system contains
0-15 % by weight cellulose ether and/or collagen and/or polyethylene glycol,
60 – 100% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight, and
0 – 15% by weight one or several glycols.
5. Effect printing ink characterized by
being water-dilutable, having a flow time of longer than 60 seconds from a DIN 53 211/4 flow cup, and containing:
   a) 0 – 15% by weight cellulose ether and/or collagen and/or polyethylene glycol,
   b) 40 – 95% by weight styrene- and/or acrylate dispersions/solutions with a solids content between 35 and 50% by weight
   c) 0 – 15% by weight one or several glycols
   d) 0 – 20% by weight one or several wax components
   e) 2 – 45 % one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.
6. Printing ink of claim 4 or 5 wherein
the styrenes or acrylates have a molar weight range between 100,000 and 10,000,000.
7 Printing ink of claim 4 or 5 wherein
the employed glycol is ethyl diglycol, ethanediol, or 1,2-propylene glycol.
8. Printing ink of one of claims 3 to 7 wherein
the wax component is based on carnauba-, polyethylene-, or polytetrafluoroethylene wax.
9. Printing ink of one of claims 2, 3, 4, 6, 7, or 8 wherein
component B contains bronze and/or aluminum in powder or paste form and/or one or several nacreous pigments and/or high-vacuum- or hydrothermally formed platelets and/or one or several color pigments.
10. Printing ink of claim 9 wherein
the employed bronze is *Bleichgold*, *Reichgold*, or *Reichbleichgold*.
11. Printing ink of claim 5 or 9 wherein
the employed nacreous pigments are Iriodine® and/or Iriobronzen®, and the employed high-vacuum-formed platelets are Metalure® and/or Dekomet® and/or Palicrom®.
12. Method for bronze or effect printing, wherein
a printing ink of one of claims 1 to 11 is processed out of the coating unit of an offset machine and/or coating machine, or out of a flexo printing unit.

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Offenlegungsschrift**

(10) **DE 41 22 990 A 1**

(51) Int. Cl.[5]:
C 09 D 11/02
B 41 M 3/00
// C09D 5/38,5/36, 17/00,101/26,189/00, 171/02,125/04, 133/04,191/06,B41G 1/00

(21) Aktenzeichen: P 41 22 990.8
(22) Anmeldetag: 11. 7. 91
(43) Offenlegungstag: 14. 1. 93

DE 41 22 990 A 1

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Prüfungsantrag gem. § 44 PatG ist gestellt

(54) Bronze- oder Effektdruckfarbe und Verfahren zur Herstellung eines Bronze- oder Effektdruckes

(57) Die Erfindung betrifft eine wasserverdünnbare Bronze- oder Effektdruckfarbe, die eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53211/4 aufweist. Die erfindungsgemäße Druckfarbe ist insbesondere dazu bestimmt, aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine verarbeitet zu werden

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Beschreibung

Die Erfindung betrifft eine wasserverdünnbare Bronze- oder Effektdruckfarbe.

Die Erfindung betrifft ferner ein Verfahren zur Herstellung eines Bronze- oder Effektdruckes.

Bei der Herstellung hochwertiger Verpackungen ist es aus gestalterischen Gründen häufig notwendig zur Erzielung eines brillianten Goldeffektes eine Maschinenbronzierung durchzuführen. Mit herkömmlichen Offset-Golddruckfarben läßt sich ein solcher Goldeffekt nicht erzielen.

Aus Gründen des Umweltschutzes, der Arbeitsplatzhygiene und der Kosteneinsparung ist man ferner bestrebt Druckfarben zu entwickeln, die bei der Trocknung möglichst geringe Lösungsmittelmengen freisetzen. Wasserverdünnbare Farbsysteme haben sich als hierfür geeignet erwiesen.

In der DE-OS 28 39 501 wird eine Goldbronzedruckfarbe in Form eines Sols beschrieben, die aus einem Bindemittel mit einem Kunstharzlack, einem Gellack, einem Tungöllack oder einem Erdöllösungsmittel und einem Amin besteht und einem Goldbronzepulver aus einer Aluminium enthaltenden Messinglegierung, das in Form feiner Plättchen vorliegt, die eine Oberflächenfettsäureschicht tragen, sowie ggf. üblichen Zusatzstoffen und Hilfsmitteln. Bei dieser Farbe handelt es sich jedoch um keine wasserverdünnbare Goldbronzedruckfarbe.

Die Maschinenbronzierung nach dem Stand der Technik weist jedoch folgende, schwerwiegende Nachteile auf:

- Es mußte bisher in einem separaten Arbeitsgang eine Goldunterdruckfarbe gedruckt werden.
- Der damit hergestellte Druck ist nicht geruchsarm, was insbesondere bei Lebensmitteln- bzw. Zigarettenverpackungen nachteilig ist.
- Anschließend muß in einem weiteren Arbeitsgang Goldbronzepuder aufgetragen werden. Der dabei nicht auf der Goldunterdruckfarbe haftende Überschuß muß durch eine Plüschwalzenwischung entfernt werden.
- Die vollständige Entfernung des Metallschliffs von den bedruckten Oberflächen (Abstauben) gelingt häufig nicht, was als ein Qualitätsmangel anzusehen ist. Das Abstauben ist häufig mit Schwierigkeiten verbunden, wie das Fahren mit geringen Maschinengeschwindigkeiten, was ebenfalls als Nachteil anzusehen ist.
- Das gebrauchte Bronzepulver muß wieder aufbereitet und neuem Pulver anteilig zudosiert werden.
- Desweiteren entstehen im Arbeitsbereich Verunreinigungen durch Bronzeflugstaub, der sowohl zu einem Mehrverbrauch an Bronzepulver als auch zu gesundheitlichen Beeinträchtigungen führen kann.
- Zur Fixierung der Bronzepartikel muß schließlich in einem dritten separaten Arbeitsgang überlackiert werden.

Die Aufgabe der Erfindung besteht somit darin, sowohl eine Bronze- oder Effektdruckfarbe als auch ein Verfahren zur Herstellung eines Bronze- oder Effektdruckes zur Verfügung zu stellen, mit denen diese Nachteile überwunden werden können.

Zur Lösung dieser Aufgabe müssen folgende Bedingungen erfüllt werden:

1. Es muß ein Bindemittel formuliert werden, das einerseits wasserverdünnbar ist und andererseits Messingschliff nicht korrodiert. Aus dem Stand der Technik bekannte alkalisch komplett verseifte Harzlösungen und ammoniakalische Dispersionen als Alleinbindemittel sind ungeeignet, da sie die Bronzeteilchen korrodieren und instabil sind.
2. Es muß hinsichtlich des Metalleffekts und der Partikelgrößenverteilung eine geeignete Bronzequalität gefunden werden.
3. Es muß für eine derartige neue Farbe ein Applikationsverfahren gefunden werden.

Diese Bedingungen können bei wasserverdünnbaren metallpigmentierten Systemen durch Einkomponenten-Druckfarben aufgrund mangelnder Stabilisierung nicht erreicht werden.

Die Aufgabe wird erfindungsgemäß durch eine Druckfarbe gelöst, die wasserverdünnbar ist, aus zwei Komponenten besteht und eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53211/4 aufweist, wobei sie vorzugsweise eine Komponente A mit 55 bis 70 Gew.-% und eine zweite Komponente B mit 30 bis 45 Gew.-% umfaßt. Besonders bevorzugt ist eine Druckfarbe, bei der die Komponente A 80–100 Gew.-% eines Bindemittelsystems und 0 bis 20 Gew.-% eines oder mehrerer Wachskomponenten umfaßt.

In einer Ausführungsform umfaßt das Bindemittelsystem

0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol

60–100 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-% und

0–15 Gew.-% einem oder mehrerer Glycole.

In speziellen Ausführungsformen weisen die Styrole- und/oder Acrylate einen Molmassenbereich von 100 000 bis 10 000 000 auf und als Glycol werden Ethyldiglycol, Ethandiol oder 1,2-Propylenglycol eingesetzt.

In einer weiteren speziellen Ausführungsform wird als Wachskomponente Wachs auf der Basis von Carnauba-, Polyethylen- oder Polytetrafluorethylen-Wachs eingesetzt. Besonders bevorzugt ist ferner eine Druckfarbe bei der die Komponente B Bronze und/oder Aluminium in Schliff- oder Pastenform und/oder ein oder mehrere Perlglanzpigmente und/oder im Hochvakuum erzeugte Plättchen und/oder ein oder mehrere Farbpigmente umfaßt.

Der Metalleffekt der verdruckten Farbe ist in starkem Maße abhängig von der eingesetzten Messing- oder Aluminium-Schliffqualität. Insbesondere ist hierbei die Teilchengrößenverteilung von Einfluß. Daneben ist ein gutes Übertragungsverhalten der Farbe in der Druckmaschine erforderlich.

Folgande einfache und doppeltpolierte Bronzen haben sich als geeignet erwiesen:

Bleichgold (3–20 μm),
Reichgold (3–20 μm),
Reichbleichgold (3–20 μm),
Reichbleichgold (3–20 μm) angeteigt in Methoxypropanol,
Aluminium (3–20 μm) angeteigt in Methoxypropanol.

Neben Bronzeschliff können auch Aluminiumschliff, Perlglanzpigmente, wie Iriodine®, Iriobronzen®, im Hochvakuum oder hydrothermal erzeugte Plättchen,

wie Metalure®, Dekomet®, Paliocrom® und Farbpigmente in gleicher Weise eingesetzt werden.

Die erfindungsgemäße Zweikomponenten-Druckfarbe erfüllt die gestellten Anforderungen sehr gut.

In dem Bindemittel-System der Komponente A dienen Celluloseether, Kollagen und Polyethylenglycol als Verdickungsmittel und Übertragungshilfe beim Druckprozeß. Als besonders vorteilhaftes Polyethylenglycol hat sich Rewopal PEG 6000 PS erwiesen.

Der pH-Wert der Styrol- und Acrylatdispersionen/-lösungen liegt üblicherweise zwischen 7,0 und 9,0.

Als geeignete Styrol- und/oder Acrylatdispersionen bzw. -lösungen haben sich Zinpol 132® und Zinpol 146® erwiesen.

Die im Bindemittelsystem verwendeten Glycole dienen als Filmbildungshilfsmittel und/oder Trocknungsverzögerer.

Zur Herstellung der erfindungsgemäßen Zweikomponentenfarbe wird zunächst die Komponente A aus dem Bindemittelsystem und einer oder mehrerer Wachskomponenten durch Zusammenmischen hergestellt. Die Wachse dienen der Einstellung der Glätte und Scheuerfestigkeit der Drucke. Als Komponenten B werden vorzugsweise Bronzen in Pastenform, d. h. angeteigte Metallschliffe verwendet. Zur Formulierung der druckfertigen Farbe werden diese dann mit dem Bindemittel langsam verrührt. Gegebenenfalls können dem Bindemittelsystem oder der Druckfarbe weitere übliche Zusätze hinzugefügt werden.

Die Auslaufzeit der verdruckten Farbe liegt zwischen 60 und 180 Sekunden Auslaufzeit, gemessen im Auslaufbecher nach DIN 53 211/4. Bevorzugt wird eine Auslaufzeit zwischen 60 und 120 Sekunden, insbesondere bevorzugt ist eine Auslaufzeit zwischen 80 und 120 Sekunden.

Wie bereits ausgeführt, sind Metallpigmente aufgrund mangelnder Stabilität für wasserverdünnbare Einkomponentendruckfarben nicht geeignet. Werden keine Metallpigmente eingesetzt, wird eine entsprechende Einkomponentendruckfarbe stabil sein.

Eine weitere Ausführungsform der Erfindung umfaßt daher eine Effektdruckfarbe, die dadurch gekennzeichnet ist, daß sie wasserverdünnbar ist, eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist und

a) 0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
b) 40–95 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-%,
c) 0–15 Gew.-% eines oder mehrerer Glycole,
d) 0–20 Gew.-% eines oder mehrerer Wachskomponenten,
e) 2–45 Gew.-% eines oder mehrerer Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugter Plättchen und/oder eines oder mehrerer Farbpigmente umfaßt.

Die hierbei eingesetzten Styrole und/oder Acrylate, Glycole, Wachskomponenten, Perlglanzpigmente, im Hochvakuum erzeugte Plättchen, und Farbpigmente sind die gleichen wie bei der Zweikomponentenfarbe.

Als Applikationsverfahren für die erfindungsgemäße Druckfarbe erwies sich die Verarbeitung aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine oder aus einem Flexodruckwerk als vorteilhaft. Dies liegt daran, daß der Weg vom Farbvorratsbehälter (Lackwanne) zum Bedruckstoff in diesem Falle kurz ist, so daß die Anzahl der Farbspaltungen gering bleibt. Als besonders vorteilhaft hat sich die Applikation über direkt auftragende Lackauftragungssysteme im Bogenoffsetmaschinen erwiesen. Der Formzylinder kann mit einem Gummituch oder Polymerklischees vom Typ APR, Napp, Cyrel, Nyloflex oder Nyloprint oder auch Druckplatten mit selbstklebender Polymerfolie belegt sein.

Die Beispiele erläutern die Erfindung.

Beispiele 1 bis 3 und 6 bis 10

Es wurde auf einer Heidelberger-Speedmaster-Bogenoffsetmaschine, die mit einer Cyrel-Platte mit Untertuch (grün, 2 mm) und einer 75er Rasterwalze (Näpfchentiefe 30 µm) ausgerüstet war, gedruckt.

Beispiel 1

Die Druckfarbe hat folgende Rezeptur:
8,25 kg Zinpol 146®
0,75 kg Wasser,
6,00 kg Reichbleichgold (8 µm) (90%ig)
Dies entspricht einem Wassergehalt von 5%, einem Pigmentenpastenanteil von 40% und einem Pigmentanteil von 36%.

Beispiel 2

Die Druckfarbe hat folgende Rezeptur:
11,00 kg Zinpol 146®
3,00 kg Wasser 8,00 kg Bronze (8 µm) (90%ig)
Dies entspricht einem Wassergehalt von 13,6%, einem Pigmentenpastenanteil von 36,0% und einem Pigmentanteil von 33%.

Beispiel 3

Die Druckfarbe hat folgende Rezeptur:
9,60 kg Zinpol 146®
7,00 kg Reichbleichgold-Paste (8 µm) (90%ig),
0,70 kg Propylenglycol (Verzögerer),
0,70 kg Wasser
Dies entspricht einem Wassergehalt von 4%, einem Verzögerergehalt von 4%, einem Pigmentpastenanteil von 38,8% und einem Pigmentanteil von 35,0%.

In allen drei Beispielen 1 bis 3 war der Ausdruck gut bis sehr gut und der Goldeffekt in Ordnung.

Beispiele 4 und 5

Die Durchführung erfolgte entsprechend den Beispielen 1 bis 3, wobei jedoch die Rasterwalze durch eine Chromwalze ersetzt war.

Beispiel 4

Die Druckfarbe hat die identische Rezeptur wie die in Beispiel 3.

Beispiel 5

Die Druckfarbe hat folgende Rezeptur:
9,625 kg Zinpol 146®
7,000 kg Reichbleichgold (8 µm) (90%ig)
0,950 kg Wasser
1,700 kg Propylenglycol.
Dies entspricht einem Wassergehalt von 4,9%, einem

Verzögereranteil von 8,8%, Pigmentenpastenanteil von 36% und einem Pigmentanteil von 33%. Die Fotopolymerplatte wurde unterschiedlich lang belichtet (22 s bis 28 s). Das beste Ergebnis zeigte eine Fotopolymerplatte mit einer Belichtungszeit von 28 s.

In den Beispielen 4 und 5 war das Ausdrucken gut bis sehr gut und der Goldeffekt ebenfalls gut bis sehr gut.

Beispiel 6

Die Druckfarbe hat folgende Rezeptur:
5 kg Zinpol 146®
1 kg Propylenglycol,
4 kg Iriodin 153®

Beispiel 7

5 kg Zinpol 146®
1 kg Propylenglycol
4 kg Iriodine 300®

Beispiel 8

9,3 kg Zinpol 146®
0,4 kg Propylenglycol
0,3 kg Metalure Typ L 55350 AE®

Beispiel 9

7,4 kg Zinpol 126®
0,5 kg Propylenglycol
2,1 kg Fanalblau D 6390®

Beispiel 10

9,0 kg Zinpol 146®
0,2 kg Propylenglycol
0,3 kg Metalure L 55350 AE®
0,4 kg Irgalith gelb LBIW®
0,2 kg Irgalith orange F2G®

In den Beispielen 6 bis 10 war das Ausdrucken gut bis sehr gut und der Farbeffekt ebenfalls gut bis sehr gut.

Durch die erfindungsgemäße Druckfarbe und das Verfahren ist es somit jetzt möglich ein der Bronzierung des Standes der Technik vergleichbaren Metalleffekt mit glattem, geschlossenem Ausdruck von Flächen bzw. offenen Ausdrucken in negativen Schriften zu erreichen. Darüberhinaus kann dieser Bronzeeffekt nunmehr im Online-Verfahren realisiert werden.

Patentansprüche

1. Bronze- oder Effektdruckfarbe, **dadurch gekennzeichnet**, daß sie wasserverdünnbar ist, aus zwei Komponenten besteht und eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist.

2. Druckfarbe nach Anspruch 1, dadurch gekennzeichnet, daß sie
55–70 Gew.-% einer ersten Komponente A und
30–45 Gew.-% einer zweiten Komponente B
umfaßt.

3. Druckfarbe nach Anspruch 2, dadurch gekennzeichnet, daß Komponente A
80–100 Gew.-% eines Bindemittelsystems und
0–20 Gew.-% eines oder mehrerer Wachskomponenten
umfaßt.

4. Druckfarbe nach Anspruch 3, dadurch gekennzeichnet, daß das Bindemittelsystem
0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
60–100 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-% und
0–15 Gew.-% eines oder mehrerer Glycole umfaßt.

5. Effektdruckfarbe, dadurch gekennzeichnet, daß sie wasserverdünnbar ist, eine Auslaufzeit von mehr als 60 Sekunden im Auslaufbecher DIN 53 211/4 aufweist und
a) 0–15 Gew.-% Celluloseether und/oder Kollagen und/oder Polyethylenglycol,
b) 40–95 Gew.-% Styrol- und/oder Acrylatdispersionen/-lösungen mit einem Festkörpergehalt zwischen 35 und 50 Gew.-%,
c) 0–15 Gew.-% eines oder mehrerer Glycole,
d) 0–20 Gew.-% eines oder mehrerer Wachskomponenten,
e) 2–45 Gew.-% eines oder mehrerer Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugter Plättchen und/oder eines oder mehrerer Farbpigmente umfaßt.

6. Druckfarbe nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß die Styrole und/oder Acrylate einen Molmassenbereich von 100 000 bis 10 000 000 aufweisen.

7. Druckfarbe nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß als Glycol Ethyldiglycol, Ethandiol oder 1,2-Propylenglycol eingesetzt wird.

8. Druckfarbe nach einem der Ansprüche 3 bis 7, dadurch gekennzeichnet, daß als Wachskomponente Wachs auf der Basis von Carnauba-, Polyethylen- oder Polytetrafluorethylen-Wachs eingesetzt wird.

9. Druckfarbe nach einem der Ansprüche 2, 3, 4, 6, 7 oder 8, dadurch gekennzeichnet, daß Komponente B Bronze und/oder Aluminium in Schliff oder Pastenform und/oder ein oder mehrere Perlglanzpigmente und/oder im Hochvakuum oder hydrothermal erzeugte Plättchen und/oder ein oder mehrere Farbpigmente umfaßt.

10. Druckfarbe nach Anspruch 9, dadurch gekennzeichnet, daß als Bronze Bleichgold, Reichgold oder Reichbleichgold eingesetzt wird.

11. Druckfarbe nach Anspruch 5 oder 9, dadurch gekennzeichnet, daß als Perlglanzpigmente Iriodine® und/oder Iriobronzen®, daß als im Hochvakuum erzeugte Plättchen Metalure® und/oder Dekomet® und/oder Paliocrom® eingesetzt wird.

12. Verfahren zur Herstellung eines Bronze- oder Effektdrucks, dadurch gekennzeichnet, daß eine Druckfarbe nach einem der Ansprüche 1 bis 11 aus dem Lackwerk einer Offsetmaschine und/oder Lackiermaschine oder aus einem Flexodruckwerk verarbeitet wird.

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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 499 382 A1**

EUROPEAN PATENT APPLICATION

(21) Application number: 92300765.2

(22) Date of filing: 19.01.92

(51) Int. Cl.⁵: **B41F 13/40, B41F 31/02**

(30) Priority: 14.02.91 US 655653

(43) Date of publication of application: 19.08.92 Bulletin 92/34

(84) Designated Contracting States: CH DE FR GB IT LI SE

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(54) Doctor blade head assembly with printing apparatus therewith.

(57) A doctor blade head assembly (30), particularly for use in a flexographic printing press (18, 20), has a head body (52) pivoted to a support frame (60) with an inflatable air tube (68) disposed therebetween. The air tube (68) extends along a channel (126) having a bottom (168) formed with spaced apart raised portions (160, 162, 164) which cause the air tube (68) to bulge out (174) at these locations. In this way the air tube (68) essentially only presses against the head body (52) at these spaced apart locations, for example at the center and adjacent the ends, which reduces the tendency of the head body (52) to bend along its length. This provides a more uniform ink film on the ink roll (32) being inked by the doctor blade head assembly (30). End seal arrangements (146) at the ends of the head body each include a resilient block seal (200) and a resilient pad seal (198) with which greased edge portions of the doctor blades (48, 50) slidably engage. The doctor blades (48, 50) overhang the ends of the ink roll (32), and an ink outlet passageway (202, 204) extends through each end seal arrangement (146) independently of the seals

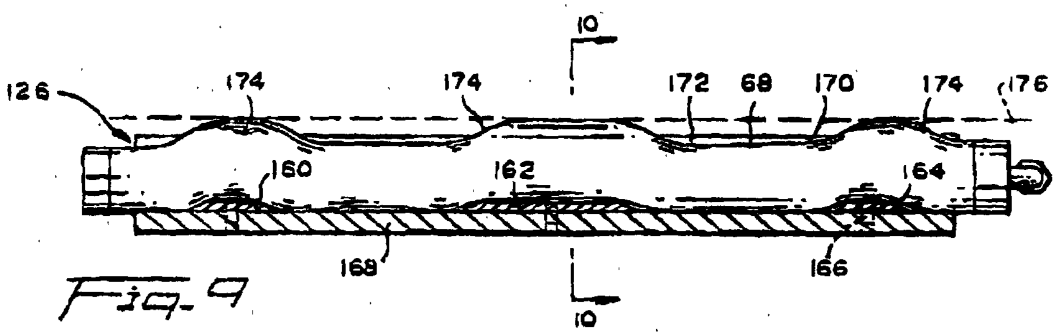

Fig. 9

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FIELD OF THE INVENTION

This invention relates to doctor blade heads in general, and also to printing apparatus employing a doctor blade head in the inking of an ink roll.

BACKGROUND OF THE INVENTION

Doctor blade heads may have one, two or more doctor blades. With two or more doctor blades, an ink reservoir can be defined between the blades. Some doctor blades are employed to seal against an ink roll to form the bottom of an ink reservoir, while other doctor blades are used for doctoring the thickness of the ink film on the ink roll, and such blades may be orientated as so called reverse angle doctor blades.

In printing, various configurations of doctor blade heads have been employed, including a head having two doctor blades with the ink reservoir contained therebetween, one doctor blade forming the bottom of the reservoir and the other being a reverse angle blade for doctoring the ink film.

Doctor blade heads are employed in flexographic printing apparatus and individual machine sections.

In Ward, Jr. et al US Patent 3,116,688, a doctor blade head is disclosed in which an inflatable air tube is employed to flex a doctor blade against an ink fountain roll. An air tube is disclosed in Harrison et al US Patent No 5,003,876 to pivot a doctor blade head against an anilox roll.

An air tube has been found to provide good control over the pressure by which the blade or blades of a doctor blade head can be pressed against an ink roll.

It is also known to provide end sealing arrangements at the ends of any ink reservoir in a doctor blade head. Examples of such end sealing arrangements are disclosed in Ward, Jr. et al and Harrison et al referred to above.

However, with the desire for higher quality printing on containers, particularly corrugated paperboard container blanks printed by flexographic printing presses, the performance of existing doctor blade heads has become more critical.

SUMMARY OF THE INVENTION

The present invention is based upon the realization that an inflatable air tube has a tendency to slightly bend a doctor blade head along its length, with consequential variation in the thickness of the ink film applied to the ink roll.

With doctor blade heads having a length of the order of 100 inches (254 cm), use of an inflatable air tube in contact with the length of such heads has been found to cause a deflection midway along the length of 20 thousandths of an inch (0.5 mm).

The present invention is also based upon the realization that particles in ink, particularly in water based flexographic ink, tend to abrade any surface portions of the doctor blades where these surface portions seal against a resilient seal. It appears that these particles, *e.g.* pigment particles, get trapped between the doctor blades and seals, and then as the blades flex abrasion occurs.

It has been realized that unwanted ink leakage and/or flow can occur due to both the above bending of the doctor blade head, and the above abrasion of the doctor blade surface, either separately or in combination. This in turn affects the quality or efficiency of the printing operation, particularly as higher quality printing is pursued.

It is an object of the present invention to provide an improved doctor blade head for higher quality printing, particularly with flexographic printing.

According to one aspect of the present invention, there is provided a doctor blade head assembly having a head body with at least one doctor blade mounted thereon, the doctor blade extending in a lengthwise direction along the head body. A support frame on which the head body is movably mounted. An inflatable air tube disposed between the support frame and the head body, and extending in said lengthwise direction, the air tube urging the head body away from the support frame when the air tube is inflated. The air tube when inflated has a plurality of bulges spaced apart along said lengthwise direction with the bulges acting upon the head body.

Preferably, the air tube is supported in the support frame with the air tube essentially only acting upon the head body via the bulges. The spacing of these bulges, *i.e.* the locations where the air tube applies forces to the head body, are preselected to mitigate the head body bending under the action on it of the inflated air tube. Although these bulges locate force centers, the inflated air tube may be spaced from or lightly engage the head body between the bulges.

The support frame may carry a plurality of raised portions acting upon the air tube to form the bulges, these raised portions being rigidly secured to the support frame either by being integrally formed or rigidly attached. The raised portions can conveniently be formed by riser plates secured to the bottom of a channel at predetermined locations. The riser plates may have predetermined lengths, and shapes, to create the bulges with predetermined lengths and extent of protrusion.

A flexible retainer may be mounted on the support frame and at least partially cover the air tube, the flexible retainer being sandwiched be-

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tween the air tube and the head body when the air tube is inflated.

The air tube may be supported on one or more raised portions having curved convex surfaces.

Preferably, there is a plurality of spaced apart hinged connections between the head body and the support frame with each of the air tube bulges being disposed between two adjacent hinge connections.

The air tube may be supported on a shallowly curved surface extending substantially the full length of the head body, for example in the bottom of a tube support channel.

According to another aspect of the invention, there is provided a doctor blade head assembly wherein a head body has two doctor blades mounted thereon and defining a reservoir space therebetween, the head body being pivotally attached to a frame structure to pivot about an axis parallel to the lengthwise direction of the head body. End plates are mounted on the head body and close the reservoir space at opposite ends thereof. An inlet in the head body introduces liquid into the reservoir space, and an outlet passageway extends through each end plate for allowing exit of the liquid from the reservoir space.

According to yet another aspect of the invention, there is provided a doctor blade head assembly including a head body having two doctor blades mounted thereon, the doctor blades converging towards each other transversely to a lengthwise direction of the head body. Free edges of the doctor blades in the lengthwise direction are spaced apart and have end portions smeared with grease. Seals comprising blocks of resilient material are located at opposite ends in the lengthwise direction of the head body, the greased end portions of the free edges slidably engaging against opposite side walls of these blocks.

According to yet a further aspect of the present invention, there is provided a printing apparatus comprising a machine frame, an anilox roll rotatably supported in and extending in an axial direction across said machine frame, a doctor blade head body having at least one doctor blade mounted thereon, this doctor blade extending in the axial direction along the head body; a support frame on which the head body is movably mounted, the support frame being supported in the machine frame, an inflatable air tube operative between the support frame and the head body, this air tube urging the head body towards the anilox roll when the air tube is inflated, and the air tube having a plurality of predetermined bulges spaced apart in the axial direction. End seal arrangements may be provided at the ends of the doctor blade or blades, with the end transverse edges of each blade being sealed outboard from the ends of the head body, preferably a layer of grease being disposed between each of such end edges and a seal pad. An ink outlet passageway may extend through each end seal arrangement independently of the locations at which the blade edges are sealed.

Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiment, the appended claims and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, in which in different Figures like reference characters indicate like parts:

- FIG. 1 is a simplified diagrammatic side elevational view of a container blank processing machine having two printing sections with doctor blade heads according to the invention;
- FIG. 2 is a diagrammatic side view, including a schematic indication in broken lines of the ink flow, of a portion of either of the printing sections of the machine of Fig. 1, but viewed from the opposite side to Fig. 1;
- FIG. 3 is a view generally on the line 3-3 of Fig. 2 of a pivotal doctor blade head assembly, some parts being omitted for simplicity,
- FIG. 4 is a stepped vertical section through the doctor blade head assembly on the line 4-4 in Fig. 3;
- FIG. 5 is a sectional view, similar to Fig. 4, but of only a portion of the doctor blade head assembly and showing an air tube retainer;
- FIG. 6 is a side view of the air tube.
- FIG. 7 is an end view of the air tube from the left side in Fig. 6;
- FIG. 8 is a view similar to Fig. 3, with some additional portions omitted for simplicity, of the preferred embodiment of the doctor blade head assembly of the invention;
- FIG. 9 is a simplified section on the line 9-9 in Fig. 8 showing the mounting and support of the air tube according to the invention,
- FIG.10 is a simplified section on the line 10-10 of Fig. 8,
- FIG.11 is a perspective view of one of the air tube supports of Fig. 9;
- FIG.12 is a view similar to Fig. 9 but showing only a modified base of the air tube channel,
- FIG.13 is a perspective view of the seal plate

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at the left hand end of the doctor blade head in Fig. 8 looking at the side of the seal plate which abuts the body of doctor blade head;

FIG.14 is the same perspective view as Fig. 13 but with a resilient seal pad and a resilient seal block mounted in position on the seal plate;

FIG.15 is a diagrammatic side view of the seal plate and seals of Fig. 14 with the two doctor blades shown in position in section;

FIG 16 is the same view as Fig. 15, but showing the preferred contact arrangement between the resilient seal block and the free edges of the doctor blades, this is a simplified sectional view on the line 16-16 of Fig. 8;

FIG.17 is a side view of the seal plate of Figs. 15 and 16 but taken from the opposite side and with the resilient seals omitted; and

FIG.18 is a cross-section on the line 18-18 of Fig 17.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is shown in relation to Figs. 1 to 4 incorporated in a dual inking system in which either a wipe roll inking system or a double doctor blade inking system can be used in the alternative to provide, at choice, inking characteristics of either inking system. A preferred use of this dual inking system incorporating the present invention is illustrated in Fig. 1 in which a flexographic printer, die-cutter, creaser and slotter machine incorporates two printing sections each having the dual inking system of Fig. 2.

The invention is, however, generally applicable to doctor blade heads, and preferred embodiments of features of the present invention are illustrated in Figs. 5 to 18. The preferred embodiment of an air tube mounting arrangement is shown in Figs. 9, 10 and 11, and the preferred embodiment of an end seal arrangement is shown in Figs. 13 and 18.

In Fig. 1, the flexographic printing machine 10 has a feed section 12 for supporting a stack of container blanks on a platform 14 and for feeding the blanks one at a time from the bottom of the stack in the downstream direction 16 of the machine Each blank then passes successively through a first printing section 18, a second printing section 20, a die-cutter section 22, and a yoked creaser and slotter section 24. The various rolls in these sections rotate in the directions indicated by arrows to feed the container blanks through the machine, pairs of feed rolls 26 feeding the blanks from one section to the next. Each printing section 18, 20 has an impression roll 28 cooperating with a print cylinder 30 carrying a printing plate, an anilox roll 32 for inking the printing plate, and a wipe roll 34 and a doctor blade head 36 on opposite sides of the anilox roll 32 for forming an ink fountain with the anilox roll In printing sections 18, 20, each wipe roll 34 is shown in engagement with its respective anilox roll 32 and each doctor blade head 36 is shown spaced a short distance from the respective anilox roll 32. Thus, each printing section 18, 20 is shown in Fig. 1 with the wipe roll inking system operative and the doctor blade inking system disengaged. Either or both printing sections 18, 20 can be changed to render the wipe roll inking system inoperative and engage the doctor blade inking system It will be noted that the dual inking systems, each comprising one wipe roll 34, one doctor blade head assembly 36, and one anilox roll 32, are disposed below the respective print cylinder 30 with the anilox roll 32 between the wipe roll 34 and the doctor blade head 36. In this way, an ink fountain can be established on either side of the anilox roll, this advantageously being either an external fountain with the wipe roll inking system or an internal fountain with the doctor blade head inking system.

One of the printing sections 18, 20 can be operated in the wipe roll mode of inking and the other in the doctor blade mode of inking. Alternatively, both printing sections 18, 20 can be operated in the wipe roll mode, or both in the doctor blade mode. Further, there could be only one printing section, or more than two printing sections, *e.g.* three sections to accommodate three primary colors

Fig. 2 illustrates the lower portion of either printing section 18 or 20, but from the opposite side of the machine 10 to that shown in Fig. 1. For ease of understanding, some parts have been omitted, some illustrated in broken lines, and a resilient cover 38 of the wipe roll 34 shown in section. The print cylinder 30, anilox roll 32, and wipe roll 34 rotate in the directions of their arrows

The wipe roll 34 is shown in an inoperative position in Fig. 2 spaced a short distance from the anilox roll 32. The wipe roll 34 is journalled in a pivotal frame and can be moved into nipping contact with the anilox roll 32 by a pair of air cylinders Similarly, the anilox roll 32 is journalled in another pivotal frame and moved into adjustable nipping contact with the printing plate of the print cylinder 30 by another pair of air cylinders. When the wipe roll inking system is operative, the wipe roll 34 engages the anilox roll 32, and ink flows out of pipe outlet 44 into the trough of the upper nip between the wipe and anilox rolls 34, 32. This forms an ink fountain between these rolls with ink flowing out of

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each end of the upper nip trough and falling into a drain tray or ink pan 46 (shown in broken lines) located below both the wipe roll 34 and the anilox roll 32 and sloping downwards to the left in Fig 2. When the wipe roll inking system, after use, is rendered inoperative, *inter alia*, the ink flow from outlet 44 is stopped, the rolls cleaned by washing, and the wipe roll 34 pivoted away from the anilox 32 to the spaced position shown in Fig. 2.

The doctor blade head assembly 36 has, mounted on a body 52, a lower forwardly directed doctor blade 48 and an upper reverse angle doctor blade 50. As shown in Fig. 2, the doctor blades 48, 50 are in engagement with the anilox roll 32 and the doctor blade head assembly 36 is in the operative position. In this operative position, ink is supplied to the top of the doctor blade body 52 via an inlet pipe 54, the ink filling an open, outwardly facing reservoir cavity formed between the body 52 and the doctor blades 48, 50. The surface of the anilox roll 32 closes the open side of this ink reservoir cavity (see also Fig. 4). Outlet pipes 56 (see Figs. 3 and 4) at each end of the body 52 discharge excess ink from this ink reservoir cavity into the drain tray 46. The head body 52 is pivotally mounted by a pivot pin 58 at each end on a frame 60. The frame 60 is pivotally mounted by a pair of pivots 62 (see also Fig 3) to a portion 64 of the main frame structure of the respective printing section 18, 20 of the machine 10. The frame 60 can be pivoted to the right (i.e. clockwise in Fig. 2) for maintenance on the doctor blade body 52, doctor blades 48, 50 etc. In the position shown, the frame 60 is locked at each end to the main frame portion 64 by a removable locking pin 66. An air tube 68, operative between the locked frame 60 and the pivotal head body 52, resiliently urges the doctor blades 50, 48 into controlled contact with the surface of the anilox roll 32. The mounting of the air tube 68 according to the invention will be described in greater detail later.

Both inking systems, i.e. wipe roll and doctor blade, share the same ink circulation system. This comprises an ink supply 70, e.g. a drum or bucket of ink, an ink supply pipe 72 inserted in the ink supply 70 and connected to the inlet of an ink supply pump 74, and a filter 76 connected by piping 78 between the outlet of the supply pump 74 and a two-way selective distribution valve 80, i.e. the valve 80 has one inlet and two alternative outlets. One outlet of the valve 80 is connected by piping 82 to the pipe outlet 44 above the nip of the wipe roll 34 and anilox roll 32. The other outlet of valve 80 is connected via piping 84 to the inlet pipe 54 of the doctor blade body 52. Ink is thus supplied by the pump 74 to either the wipe roll 34 or the doctor blade head assembly 36 depending upon the position of the valve 80. In either case, excess ink flows into the drain tray 46 and drains to two spaced-apart side sumps 86 therein (only one sump can be seen in Fig 2), an outlet 88 of each sump 86 being connected by return piping 90 to the ink supply 70 via an ink return pump 92. Thus, whichever inking system is selected and in operation, the ink fountain of that system with the anilox roll 32 is kept filled to a certain level with excess ink supplied by the supply pump 74 being returned to the ink supply container 70 by the ink return pump 92. The return pump 92 preferably is operated at an effective pumping rate greater than that of the supply pump 74.

Fig. 3 shows a somewhat simplified view generally on the angled line 3-3 in Fig. 2 of the doctor blade head assembly 36 mounted by the pair of elongate pivot pins 62 to the main frame structure portion 64 between side frame plates 98. The ink inlet pipe 54 enters the top of the body 52 centrally of the length thereof. The two ink outlet pipes 56 leave the ends of the body 52 at locations below the location of entry of the inlet pipe 54 into the body 52. The ink outlets may be lower than shown and preferably the sum of the areas of the two ink outlets is less than the area of the ink inlet 54. The pivot pins 62 of the frame 60 are pivoted at each end in flanges 100 extending upwardly from the machine frame portion 64. A coil spring 102 encircles each pivot 62 with one end of the spring being secured to one of the flanges 100 and the other end secured to a collar 104 non-rotatably fixed on that pivot pin. When the locking pin 66 (see Fig 2) is removed from each end of the doctor blade assembly 36 and the assembly 36 pivoted about the pivots 62 away from the anilox roll (i.e. clockwise in Fig. 2), the springs 102 are torsionally tensioned to partially counterbalance the weight of the whole assembly 36. An adjusting screw 106 is threaded through another flange 107 extending upwardly from the machine frame portion 64 of Fig. 3, the end of this screw 106 being rotatably captured in a counterbore 108 in the inner end of the right-hand pivot pin 62. Rotational adjustment of the screw 106 moves the righthand pivot pin 62 axially relative to the flanges 100 in which it is journalled. Both pivot pins 62 are movable axially relative to the flanges 100. In this way, the axial position of the doctor blade assembly 36 can be adjusted axially relative to the anilox roll. Preferably, an operator rotates the adjusting screw 106 a partial turn each day to more evenly distribute any wear between the doctor blades 48, 50 and the surface of the anilox roll 32.

Fig. 4 shows a vertical section through the doctor blade assembly 36 on the stepped line 4-4 in Fig. 3. The flexible doctor blades 48, 50 are clamped in adjusted position to the body 52 by backing plates 110 and clamping screws 112. An

internal ink reservoir or fountain 116 is defined in the doctor blade assembly 36 between the doctor blades 48, 50, a face 118 of the body 52, and a portion of the surface of the anilox roll 32. In the direction of rotation of the anilox roll 32 shown by the arrow 120, the lower doctor blade 48 functions as an ink retaining blade forming the bottom of the fountain 116; and the upper doctor blade 50 functions as a reverse angle doctor blade to scrape the inked surface of the anilox roll 32 and doctor the thickness of the ink film conveyed by the surface of the anilox roll to the printing plate on the print cylinder 30 (Fig. 2). The doctor blades 48, 50 may have the same flexibility; preferably, however, the upper blade 50 extends as a short stiff blade for doctoring, and the lower blade 48 extends further, is more flexible and is flexed upwardly against the surface of the anilox roll 32 for improved sealing therewith. Improved sealing of the lower blade 48 can be obtained by allowing this blade to flex sufficiently that its outer surface at its free edge tangentially wipes against the anilox roll surface.

The lateral ends of the reservoir 116 are sealed by resilient rubber gaskets 122 (see Fig. 2) which seal against the two doctor blades 48, 50, the cylindrical surface of the anilox roll 32, and the flat ends of the body 52, the gaskets 122 being clamped in position by end plates 124 (only one of which can be seen in Fig. 2). However, a preferred manner of sealing is described later.

The air tube 68 is located in a channel 126 on the frame 60. Eye bolts 128 are screwed into the tops of the body 52 and the frame 60. A coil spring 130 has its ends connected to the eyes of the bolts 128 and is under tension to resiliently urge the body 52 to pivot clockwise (in Fig. 4) about its pivot pins 58 towards the frame 60. Thus, when compressed air is introduced into the air tube 68, the expansion of the tube 68 overcomes the bias of the spring 130 and rotates the body 52 counterclockwise about the pivot pins 58 to urge the free ends of the doctor blades 48, 50 against the anilox roll 32. The degree of inflation of the tube 68 in general determines the pressure with which the blades 48, 50 are pressed against the anilox roll 32. Upon allowing the tube 68 to deflate by exhausting the compressed air therefrom, the spring 130 will function to pivot the head 52 clockwise and space the ends of the doctor blades 48, 50 away from and out of contact with the surface of the anilox roll 32, thus the default position of the doctor blade assembly 36 is the inoperative position with the doctor blades 48, 50 spaced from the anilox roll 32.

Fig. 5 shows a portion of Fig. 4 with a preferred retainer 132 holding the air tube 68 in the channel 126. The retainer 132 is a thin flexible plastic strip, extending the full length of the channel 126, and secured to the lower wall of the channel 126 by a plurality of screws 134. Widthwise the strip 132 extends upwardly in cantilever fashion, and flexes towards the channel 126 by being sandwiched between the outer protruding surface of the air tube 68 and the back of the doctor blade head body 52. The retainer strip 132 flexes readily during the expanding and contracting of the air tube. When the doctor blade body 52 pivots away from the frame 60, the flexible strip 132 retains the air tube 68 in position. Also, the strip retainer 132 eliminates any tendency for wear and abrasion between the air tube and the body 52 during operation of the doctor blade head.

Fig. 6 shows the elongated air tube 68, which preferably is made of a nylon weave fabric covered with plastic and lays flat when deflated. Each end of the tube 68 is clamped by a ring clamp 136 over a cylindrical metal boss 138 having a central bore (see also Fig. 7). The boss 138 at the left hand end of the tube 68 is closed by a screw plug 140 (Fig. 7), and a right angle connector 142 for an air line pipe is screwed into the right hand end boss.

Fig. 8 is a similar view to Fig. 3, and shows the preferred doctor blade head assembly 144 of the invention. The head assembly 144 is essentially the same as previously described with respect to Fig. 3, except for the mounting of the air tube 68 and the end seal arrangements 146 at each end of the doctor blade head body 52. Only these differences need be described. As can be seen, the clamped ends, with the clamps 136, of the air tube 68 extend a short way past the ends of the backing and support frame 60. The channel 126, along the length of the body 52, is indicated by broken lines. Each end seal arrangement 146 includes an end plate 148 which is clamped by a pair of screws 150 against the respective end of the head body 52. A drip guard 152 is clamped by the same screws 150 to the outer side surface of this end plate 148. Each end plate 148 is disposed just outboard of the adjacent vertical end of the anilox roll 32 (Fig. 2), and the drip guard 152 forms a scoop which has a lower wall extending under the respective end plate and end of the head body 52 to direct ink exiting from the doctor blade head assembly into the drain tray 48 (Fig. 2). In end view, the portion of each drip guard 152 under the head body 52 would be positioned and extend similarly as the lower exit leg of the outlet pipe 56 as shown in Fig. 4 - the two drip guards 152 taking the place of the two outlet pipes 56 previously described. It should be noted that each drip guard 152 has an upper and rear wall 154, a side wall 156, an inwardly turned front wall and an underneath bottom wall 158 which extends forwardly below the upper wall 154 and the head body 52. The ink inlet for the head assembly 144 is the same as that for the previously de-

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scribed head assembly 36.

Fig. 9 is a simplified section along the line 9-9 of Fig. 8 with the air tube 68 not being shown in section. This could also be a similar section along the head embodiment of Fig. 3. Three riser plates 160, 162, 164 are rigidly secured by screws 166 to the bottom 168 of channel 126 (*i.e.* to the back wall of the channel against the frame 60 as viewed in Fig. 4). The riser plates 160, 164 are equal in size and disposed symmetrically a short distance inward from the ends of the channel bottom 168. The third riser plate 162 is longer than the plates 160, 164 and is disposed midway along the length of the channel bottom 168. The plates 160, 162, 164 are relatively thin and have ramped ends, each end ramp extending away from the channel bottom 168 at an acute angle of about 15 degrees. The air tube 68, when inflated, may be below the outer longitudinal edges 170 of side walls 172 of the channel 126. However, the portions of the air tube 68 that pass over the riser plates 160, 162, 164 are consequentially caused to bulge out beyond the side walls 172 of the channel 126. This can be clearly seen in Fig. 8 where three bulges 174 of the tube 68 protrude out of the channel 126 and engage against the back surface 176 (indicated as a broken line) of the doctor head body 52 (see also Fig. 5). Although not shown in Fig. 9, the flexible retainer strip 132 (Fig. 5) is deformed and sandwiched between these three bulges 174 and the surface 176. When the air tube 68 is deflated, the bulges 174 may retract into the channel below the channel wall edges 170.

Fig. 10 is a section on the line 10-10 of Fig. 9 and shows the central bulge 174 protruding beyond the outer edges 170 of the channel side walls 172. The central riser plate 162 causing this bulge can be seen extending across the full width of the bottom of the channel 126, as do the other riser plates 160, 164.

Fig. 11 shows in perspective view the riser plate 160, the riser plate 164 being identical and the longer riser plate 162 being similar. The ramped ends 178, and a central hole 180 for the securing screw, can clearly be seen.

Fig. 12 shows a modification of the channel bottom 168 in which the three riser plates of Fig. 11 are replaced by three risers integrally formed with the channel bottom. The channel bottom 168 is machined to form three mounds of curved profile to provide three integral risers 182 which function similarly to the risers 160, 162, 164 in Fig. 9.

Fig. 13 shows in perspective view the inner side of the lefthand end plate 148 in Fig. 8, the righthand end plate being the mirror image thereof. An inner surface 184 is securely fastened, in liquid tight manner, to the respective end of the doctor blade body 52, with the screws 150 in Fig. 8 passing through bores 186. Angled shoulders 188 are contacted by and support the very end portions of the doctor blades. The ends of the doctor blade body 52 are the same shape and size as the surface 184. An outer end wall 190 protrudes beyond the shoulders 188 and contains a central elongated recess 192 having curved upper and lower ends. As will be readily realized, the outer end wall 190 is spaced outwardly from, and beyond, the adjacent vertical end surface of the doctor blade body 52 (Fig. 8) to which the inner surface 184 is secured. Between the angled shoulders 188 are machined two depression-like grooves 196 leaving a flat topped land 194 therebetween. This land 194 is coplanar with the rearward longitudinal side of the recess 192. As can be seen, the upper depression-like groove 196 is narrower than the lower groove 196, so displacing the land above the center of the end plate 148 and above the center of the longitudinal recess 192.

Fig. 14 is the same view as Fig. 13, except a resilient seal 198 is inserted and glued in the recess 192, and a resilient seal 200 covers completely and is glued to the land 194. The seals are preferably formed of closed cell foam rubber. The seal 198 is a pad which protrudes very slightly (a few thousandths of an inch) proud of the inner surface of the outer end wall 190. The seal 200 is a block which completely, and exactly, fits the entire flat surface of the land 194. The block seal 200 extends only part way across the width of the pad seal 198 (as clearly shown in Fig. 14), but the outer end surface of the block seal abuts and seals against the inner proud face of the pad seal 198.

Fig. 15 shows the upper stiff doctor blade 50, and the longer and more flexible lower doctor blade 48, in their operative positions, both blades being shown in section. The free operative edges of the two blades can be seen slightly overlapping and depressing into the upper and lower portions of the outer surface of the block seal 200. In this way, the block seal 200 closes and seals the gap between the two doctor blades at the end location where the extreme ends of these blades extend axially past the ends of the anilox roll. The free operative edges of these blades also engage the anilox roll as illustrated in Fig. 4, except the lower blade 48 can now be seen flexed to provide somewhat more tangential contact with the upwardly rotating anilox roll. Also, the grooves 196 extend right through the end plate 148 as two spaced-apart apertures 202, 204, with the upper aperture 202 being smaller than the lower aperture 204. These apertures 202, 204 have a combined cross-sectional area of less than half the cross-sectional area of the single ink inlet aperture at the outlet of the ink inlet pipe 54 (Figs. 2 and 3), and function as ink outlet apertures (two at each end of the doctor

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blade head).

Fig. 16 is the same view as Fig. 15, but illustrating the preferred manner of adjusting and sealing the doctor blades 48, 50. As can be seen in Fig. 16, the doctor blades are adjusted so that the free and operative edges of the blades engage against the upper and lower side walls of the black seal 200. Further, the free edges of the doctor blades, to be sealed by the seal 200, are smeared with a non-water soluble grease, such as a lithium based grease as used in gear trains, bearings, etc. This grease layer is indicated by the reference numeral 206, and facilitates the free edges of the doctor blades sliding over and relative to the upper and lower surfaces of the block seal 200 as, in use, the doctor blades flex slightly. These grease layers 206 also complete and improve the liquid seal between the doctor blade edges and the block seal 200. It has been found that this preferred sealing arrangement mitigates solid particles, *e.g.* ink pigments, becoming trapped between the doctor blades and the seal 200, so minimizing any tendency for such particles to scratch and damage the sealing edges of the doctor blades.

A similar grease layer is smeared on the end, upright edges of the doctor blades where these somewhat upright edges engage the pad seals 198 (shown in Fig. 14 but omitted for clarity from Figs. 15 and 16). This facilitates sliding of these upright end edges over the pad seals 198 as the doctor blades flex in use. It also improves the seal between these upright end edges and the respective seal 198 and minimizes abrasion of these upright end edges by ink particles, *etc.*

Fig 17 shows the exterior side of the end plate 148, that is the opposite side to that shown in Figs. 13 to 16. The recess 192, for the pad seal 198, is shown in broken lines, as are the angled shoulders 188. The through apertures 202, 204 are interconnected on the exterior side and open into a channel 208. This channel extends from its top, level with the top of the seal recess 192, to the bottom of the side plate 148 where the channel 208 is open. The apertures 202, 204 communicate with the channel 208 adjacent a rear side thereof and in the upper half thereof. The whole of the channel 208 is covered by the side wall 156 of the respective drip guard 152 (Fig. 8) secured to the exterior surface of the end plate 148. Thus, the channel 208 is completely closed except for an inlet via the apertures 202, 204 and an outlet at the lower edge of the side plate 148.

Fig 18 is a section on the line 18-18 of Fig. 17 and shows the open lower end 210 of the channel 208. It also shows the lower aperture 204 and the seal recess 192.

In operation, ink enters the ink reservoir 116 (Fig. 4) between the doctor blades 48, 50, fills this ink reservoir, and the excess ink exits at each end of the doctor blade head via the respective pair of apertures 202, 204 and the downwardly extending channel 208. The ink exits through the downwardly facing open end 210 of each channel onto the respective drip guard 152 (Fig. 8) which directs this excess ink into the ink pan 46. As the total area of the ink outlets is less than the area of the ink inlet (via inlet pipe 54), the reservoir 116 in the doctor blade head is kept full of ink. The sliding grease seals at the edges of the doctor blades abutting the resilient seals 192 and 200, substantially eliminate deterioration of these edges and provide improved sealing of extended life. The intermittent bulges 174 (Figs. 9 and 10) along the air tube 68 enable the doctor blade head to be engaged against the anilox roll with the required control to maintain a good liquid seal between the lower doctor blade 48 and the anilox roll, while the positioning of these bulges enables the doctor blade head to remain virtually perfectly straight along its length, so keeping the reversed angle doctor blade 50 perfectly straight along its length to provide improved uniformity of the doctoring function by this blade.

As will be appreciated, the features of Figs 9 through 18 provide a doctor blade head with improved doctoring, improved life of the end sealing, and virtual elimination of unwanted ink leakage. By improving the control and uniformity of the doctored ink layer on the anilox roll in this manner, finer and improved quality printing can be achieved. Also, the elimination of ink leakage further enables improvement in quality, and facilitates better clean-up after printing.

The air pressure in the air tube 68 is preferably controlled during printing at a predetermined value in the range 15 to 40 pounds per square inch (1.1 to 2.8 kilograms per square cm).

The number of air tube bulges 174 can be varied depending upon the length of the doctor blade head and the number of locations at which the head body 52 is hinged to the support frame 60 of the doctor blade head assembly 36. For example, there could be four bulges, or five bulges or with a short doctor blade head only two bulges. With 80 inch (203 cm), 113 inch (287 cm) and 123 inch (312 cm) wide flexographic printing sections, the three bulge arrangement of Fig. 8 with four hinge attachments between the head body of the support frame, has been found highly satisfactory, the head body and doctor blades being kept straight within a tolerance of 5 thousandths of an inch (0.127 mm) over their entire length. The respective bulges 174 occurred between adjacent hinge attachments. The exact positioning of these bulges for optimum results is best finalized by trial and error.

With the 80 inch (203 cm) machine, the center

riser plate 162 was 7 inch (17.8 cm) long, while the end riser plates 160, 164 were each 5.5 inches (14 cm) long and were centered 28 inches (71.1 cm) from the center of the head body. With both the 113 inch (287 cm) machine and the 123 inch (312 cm) machine, the center riser plate 162 was 10 inches (25.4 cm) long and the end riser plates 160, 164 each 5.5 inches (14 cm) long; however, with the 113 inch (287 cm) machine the end riser plates were each 29 inches (73.7 cm) off center, and with the 123 inch (312 cm) machine the end riser plates were each 34 inches (86.4 cm) off center. In all cases the ends of the riser plates were ramped upwardly at 15 degrees from the bottom of the air tube channel 126. Each riser plate was 0.35 inches (0.89 cm) in thickness (*i.e.* in height in Figs. 9 and 10) between the ramped ends. The width of the riser plates across the channel 126 (as in Fig. 10) was 1.48 inches (3.76 cm).

The above described embodiments, of course, are not to be construed as limiting the breadth of the present invention. Modifications, and other alternative constructions, will be apparent which are within the scope of the invention as defined in the appended claims.

For example the doctor blade head could be employed in a glue applying machine.

Fluid other than air could be used to inflate the air tube, the expression air tube is intended to cover such use of other fluids.

The air tube could be supported on a shallowly curved concave surface extending substantially the full length of the head body, for example in the bottom of the tube support channel. The end portions of the tube would then in effect form two bulges, one located at each end of the head body. In this case, however, the tube would be uniformly supported over the entire length of the shallowly curved concave surface, and would also tend to deform to contact the head body over the length thereof as the air tube is inflated and further pressurized. Turning to Fig. 9, this could be achieved by eliminating the center riser 162, and forming the end risers 160, 164 as one long riser plate having a concave upper surface extending symmetrically from the center to both ends with the shallowest portion of this long riser plate being at the center (where plate 162 is in Fig. 9). Such an arrangement would have two tube bulges 174 spaced apart along the channel 126, these bulges at the end portions of the tube protruding out of the channel 126; this protruding being caused by the lengthwise end portions of the channel being raised portions relative to the remaining central portion of the channel. Thus, such an arrangement has two tube bulges, even though the tube would tend to deform to eventually try and contact the head body over the entire length of the tube as the inflation pressure was sufficiently increased.

Although in Fig. 9 the air tube 68 is shown recessed below the side walls of the channel 126 between the tube protrusions 174, this arrangement is not essential. It has been found convenient to allow the air tube between the tube bulges 174 to also extend out of the channel 126 and come into touching or light contact with the back wall 176 of the head body 52. By keeping the height of the riser plates 160, 162, 164 fairly small (*e.g.* 0.35 inch (0.89 cm)) and the air tube diameter relatively large (*e.g.* 1 to 2 inches (2.54 to 5.08 cm)), it has been found that the air tube can have kissing-like contact with the head body between the tube bulges 174, while the area of these tube bulges transmits the main force to the back wall of the head body at predetermined spaced locations. The compression, or pinching, of the air tube between the riser plates and the back wall of the head body creates and positions the forces acting on the head body via the air tube. This kissing contact of the air tube between the tube bulges has become the preferred arrangement.

Claims

1. A doctor blade head assembly, comprising:

   a head body having at least one doctor blade mounted thereon, said doctor blade extending in a lengthwise direction along said head body;

   a support frame on which said head body is movably mounted;

   an inflatable air tube disposed between said support frame and said head body, and extending in said lengthwise direction, said air tube urging said head body away from said support frame when said air tube is inflated; and

   said air tube when inflated having a plurality of bulges spaced apart along said lengthwise direction with said bulges acting upon said head body.

2. The doctor blade head assembly of Claim 1, wherein said plurality of bulges comprises a bulge located adjacent each end of said head body.

3. The doctor blade head assembly of Claim 1 or 2, wherein said tube is supported in said support frame, and said tube only acts upon said head body via said bulges.

4. The doctor blade head assembly of Claim 1, 2 or 3, wherein said tube is disposed in and extends along a channel in said support frame, said channel having a bottom formed with a

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plurality of raised portions.

5. The doctor blade head assembly of any preceding claim, including a flexible retainer mounted on said support frame and at least partially covering said air tube, said flexible retainer being sandwiched between said air tube and said head body when said air tube is inflated.

6. The doctor blade head assembly of Claim 5, wherein said retainer comprises a strip extending in said lengthwise direction, said strip having a free edge also extending in said lengthwise direction, and said strip flexing to accommodate said bulges when said air tube is inflated

7. The doctor blade head assembly of Claim 4, wherein said raised portions comprise riser plates secured to said channel bottom

8. The doctor blade head assembly of Claim 7, wherein each said riser plate has a ramp at each end.

9. The doctor blade head assembly of Claim 4, wherein said raised portions are integral with said channel bottom.

10. The doctor blade head assembly of Claim 4, wherein said raised portions are formed by a curved surface.

11. The doctor blade head assembly of any preceding claim, wherein said air tube is flat when deflated

12. The doctor blade head assembly of any preceding claim, including a plurality of spaced apart hinged connections between said head body and said support frame, each of said bulges being disposed between two adjacent hinge connections

13. The doctor blade head assembly of any preceding claim, wherein:

said head body has an end plate mounted thereon at each end in said lengthwise direction,

each end plate includes an outer end wall spaced outwardly away from the respective head body end,

each said outer end wall supports a resilient seal, and

each doctor blade extends beyond each said head body end and abuts the respective seal

14. The doctor blade head assembly of any one of Claims 1 to 12, wherein:

said head body has an end sealing plate at each end;

said doctor blade has a transverse edge at each end abutting the respective end sealing plate; and

each said transverse edge has grease thereon which enables that edge to slide on said end sealing plate

15. The doctor blade head assembly of Claim 14, wherein each said end sealing plate includes a resilient seal and the respective greased transverse edge engages said resilient seal.

16. A printing apparatus, comprising:

a machine frame;

an anilox roll rotatably supported in and extending in an axial direction across said machine frame;

a doctor blade head body having at least one doctor blade mounted thereon, said doctor blade extending in said axial direction along said head body;

a support frame on which said head body is movably mounted, said support frame being supported in said machine frame;

an inflatable air tube operative between said support frame and said head body, said air tube urging said head body towards said anilox roll when said air tube is inflated; and

said air tube when inflated having a plurality of predetermined bulges spaced apart in said axial direction, said bulges acting upon said head body and being positioned to mitigate bending of said head body along said axial direction by the inflated air tube.

17. The printing apparatus of Claim 16, wherein said air tube when inflated has kissing contact with said head body between said bulges

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eine hauseigene Lackplattenherstellung sondern verläßt sich vielmehr auf das Know-how der Fachleute bei *Rudolf Reproflex* in Goslar. Wie es sich für einen Offsetdrucker gehört, werden die Platten gespannt (man hat auch das Kleben versucht). Hier hat man noch etwas Probleme mit dem "korrekten" Spannen und wünscht sich einen steiferen Träger, um Passerungenauigkeiten durch Verzug beim Spannen zu minimieren.

Zum modifizierten Lackturm mit seinem Auftragsystem bleibt anzumerken: Während der Präsentation wurde noch im "quasi Quetschbetrieb" gearbeitet; die Farbe läuft aus dem Farbkasten zwischen eine "Verreiber"- und eine Auftragswalzer. Die Endversion wird eine Rasterwalze und ein Kammerrakelsystem umfassen, das aus Zeitgründen noch nicht installiert war. Somit ist dieser Teil ein echtes Flexodruckwerk!

Was hat der Flexodruck davon?

Nach Auskunft von Dipl.-Ing. Andrea Heinemann vom Farbhersteller *Michael Huber München GmbH* wurden natürlich Versuche auch auf der hauseigenen Flexodruckmaschine in Celle gemacht. Die Ergebnisse lassen die klare Aussage zu, daß diese neue Farbe auf jeder normalen Flexodruckmaschine zu verdrucken sei. Der Drucker müsse sich natürlich an eine höhere Viskosität gewöhnen, die aber deutlich unter der "Zähflüssigkeit" einer UV-Farbe liege.

Große Anwendungsbereiche könnten z.B. Verpackungen und der Etikettensektor sein, die schon heute häufig mit anderen Verfahren veredeln (z.B. Heißprägefolien). Erstaunlicherweise sei aus der Ecke des Flexodrucks noch keine Anforderung an das Team herangetragen worden, so daß die Entwicklungsarbeit zu dieser neuen Farbe auf Drängen eines Offsetdruckers entstand. Nun denn, jetzt kann der Flexodruck von einem anderen Druckverfahren profitieren.

Die Farbe

Im folgenden Abschnitt wird das Referat von Andrea Heinemann mit den wichtigsten Passagen und Aussagen zu technischen Details der neuen *Acrylac Gold- und Silberfarben* wiedergegeben.

Heute gibt es verschiedene Möglichkeiten werbewirksame Metalleffekte zu erzielen:

- Einsatz metallisierter Bedruckstoffe und lasierende Druckfarben (hauptäschlich bei Flaschen-Etiketten),
- Bronzierung,
- Prägefoliendruck,
- Tiefdruck.

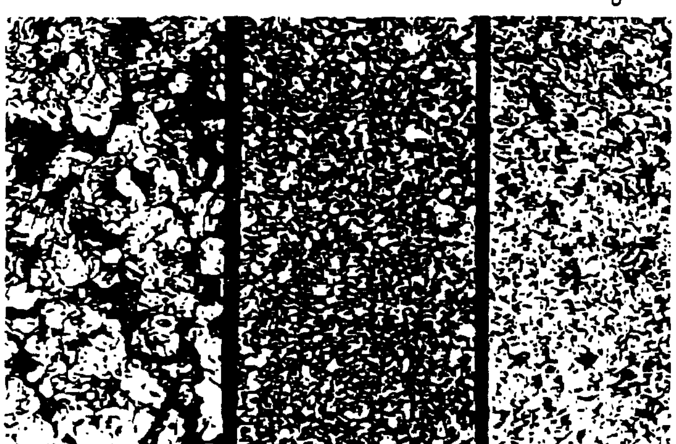
Jedes dieser Verfahren weist entsprechende Nachteile auf (siehe *Tabelle 1*). Bei der "neuen" Farbe sollte möglichst wenig Nachteile z.B. zusätzliche Anlagen, Kosten, Umweltbelastungen) mit den bestmöglichen Vorteilen (höchster Metalleffekt und Wirtschaftlichkeit) verknüpft werden.

Verfahren	Nachteile
Metallisierte Bedruckstoffe	hohe Bedruckstoffkosten
Bronzierung	Bronzieranlage Verschmutzung Abstaubprobleme mehrere Maschinendurchgänge
Prägefoliendruck	Folienprägeanlage Recycling mehrere Maschinendurchgänge
Tiefdruck	Tiefdruckanlage Lösemittelentsorgung Auslastung

Tabelle 1

Zum Parameter Metalleffekt muß gesagt werden, daß zwei unterschiedliche Verfahren zur Herstellung der Aluminium- oder Messing-Pigmente eingesetzt werden: *Hochvakuumverfahren* (sehr aufwendig und teuer, aber deutlich besserer Metalleffekt) oder *Mahlen*. Durch die Herstellung bedingt, entsteht eine Streuung der Teilgröße, die wieder einen entscheidenden Einfluß auf die Deckfähigkeit und das Ausdruckverhalten der Farbe hat: mit zunehmender Teilchengröße verringern sich Deckkraft (aber die Brillanz nimmt zu) und das Ausdruckverhalten (Randschärfe). Die Auswahl geeigneter Teilchengrößen kann als entscheidende Qualitätsunterschiede bringen.

Neben dem Einfluß der Metallpigmente sind weitere Kriterien für die Brillanz einer Goldfarbe entscheidend (siehe *Tabelle 2*). Wäßrige Bindemittel ermöglichen ein besseres Aufschwimmverhalten; die Pigmen-



Mikroaufnahme einer Goldfarbe: Bronzierung (links), Acrylac Gold (Mitte), Offsetgold (rechts).

W018759

PATENT NO EP (UK) 0543385

TRANSLATION OF EUROPEAN PATENT (UK) UNDER SECTION 77 (6) (a)

Date of Publication of the Translation 8 MAR 1995

ficial use

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EP 92119749.7 (0543385)

❷ Proprietor's details

2 Please give the full name(s) and address(es) of the proprietor(s) of the European Patent (UK):

Name Joachim Dyes Lackfabrik GmbH

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5 Please give a name and address in the United Kingdom to which all correspondence will be sent:

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Address Prudential Buildings, Room 24
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Postcode

ADP number *(if known)* 5957568001

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DECLARATION

I, Michael Wallace Richard Turner, B.A., C.P.A., of 16 Bellevue Road, Southampton SO1 2AY, England, do hereby declare that I am conversant with the German and English languages and I certify that the following translation made by me is to the best of my knowledge and belief a true and correct translation of the authentic text for grant of European patent No 0543385 in pursuance of The Patents Rules 1990.

M W R Turner

....

M W R Turner

Signed this 12th day of January 1995

The present invention concerns a novel water-based printing ink which is suitable in particular for gold and silver inks.

Printing on paper or cardboard packaging with gold or silver inks is difficult, in particular when offset printing processes are to be used. Generally the procedure is such that a bronzing base printing ink is applied by machine to the sheet to be printed upon, in an additional working operation. A bronze powder is then dusted onto that ink on a bronzing machine in the same working operation. The so-called bronze surface coat is bonded to the sheet to be printed upon, by the subsequent ink drying operation. After the drying operation the sheet is lacquered over with solvent lacquer, water lacquer or UV-lacquer, in order to fix the more or less loose bronze particles.

A disadvantage of that procedure is that an additional lacquering operation is required for fixing the metal surface coating. In addition the metal surface coating dusts used can result in the place of work being endangered from the point of view of health. In addition, fouling of the machines and the printed products in the printing works is something that has to be accepted. Nonetheless this really complicated procedure has been used hitherto as the printing result is of high visual quality.

When using gold varnish inks, a one-component or two-component gold ink is applied to the sheet to be printed upon, for example by means of a sheet offset machine, in a wet-in-wet process. As the sheets to be printed upon are then generally directly subjected to further treatment, subsequent lacquering is also required in this case in order to provide good abrasion resistance.

This wet-in-wet application procedure suffers from the disadvantage of a loss of brilliance of the gold inks, which is caused by the lacquering operation. In addition the metal surface coating of the gold ink has a tendency to oxidation, due to the absorption of moisture, and that results in a loss of shine as well as a change in colour tone towards a blackening effect.

Similar problems also occur with silver printing inks, as with gold inks. In this case also the abrasion resistance is satisfactory only when a subsequent lacquering operation is carried out.

The problem of the present invention is to provide water-based printing inks with which gold and silver inks, bronzes and the like can be applied in a single working operation, without the occurrence of disadvantageous changes in colour tone, loss of brilliance and shine, which have a high level of abrasion

resistance and which can be used in the most widely varying printing processes.

That problem is solved by a printing ink as set forth in the main claim, the appendant claims setting out preferred embodiments of the invention. The method claims concern printing methods in which the printing inks according to the invention can be used.

The printing inks according to the invention are formed on the basis of styrene-methacrylic acid ester copolymers, vinyl propionate-vinyl pyrrolidone copolymers and/or methacrylate esters. Such copolymers are known, it is however surprising that in contrast to other polymers for aqueous inks, in the case of styrene-methacrylic acid ester copolymers, when using gold or silver inks, the above-mentioned disadvantages and in particular the loss of brilliance and shine as well as the lack of abrasion resistance do not occur. Accordingly the printing inks according to the invention are the first to afford the possibility of processing gold and silver inks in aqueous inks in a single working operation using the most widely varying printing machines.

The styrene-methacrylic acid ester copolymers according to the invention contain from about 60 to 95% by weight of styrene and from about 5 to 40% by weight of methacrylic acid ester, relative to the total amount of the polymers. A preferred composition is one which contains from about 70 to 90% by weight of styrene and from about 10 to 30% by weight of methacrylic acid ester. Preferred methacrylic acid esters are the esters of methacrylic acid with alcohols with from 1 to 4 carbon atoms, in particular methyl esters are used. The copolymers used in the printing inks according to the invention are employed both in the form of an aqueous dispersion and also in the form of a solid resin. In the aqueous dispersions the copolymers in fact have weights of more than 100,000, preferably more than 200,000, and their acid number is below 150, preferably below 100, and in particular between 70 and 100. The water content of such aqueous copolymer dispersions is between 60 and 50% by weight.

The copolymers used as solid resin have molar weights of below 100,000, preferably below 50,000. Their acid number is above 150, preferably in the range of from 150 to 300 and particularly preferably in the range of from 150 to 250. The water content of those solid resins is so low that it can be disregarded.

The printing inks according to the invention may contain from 1 to 60% by weight of an aqueous dispersion of styrene-methacrylic acid ester copolymer. When used in printing mechanisms of offset printing machines and the like and similar apparatuses in which a high viscosity is desired, the content of aqueous dispersion is generally from 1 to 30% by weight, preferably from 5 to 12% by weight and in particular

from 6 to 10% by weight.

In regard to styrene-methacrylic acid ester copolymer in the form of solid resin from 1 to 40% by weight is used, when used in inking mechanisms, for example of offset printing machines and the like or similar apparatuses, the amount of solid resin is in particular from 5 to 40% by weight, preferably from 10 to 15% by weight and particularly preferably from 10 to 12% by weight.

The styrene-methacrylic acid ester copolymer used as the solid resin can be totally or partially replaced by vinyl propionate-vinyl pyrrolidone copolymer or methacrylate ester of alcohols with from 1 to 4 carbon atoms, in which case the total amount used remains unaltered.

When the inks according to the invention are used in lacquering assemblies, lacquering machines, separate lacquering mechanisms or sizing or lacquering mechanisms of roll-fed offset machines the ink should generally be of a lower viscosity. Accordingly in relation to this purpose of use the contents are also different from those set forth hereinbefore. In the case of this purpose of use the content of aqueous dispersion is generally from 1 to 50% by weight, preferably from 3 to 30% by weight and particularly preferably from 25 to 30% by weight. The content of solid resin is generally from 1 to 40% by weight, preferably from 3 to 30% by weight and particularly preferably from 3 to 25% by weight, in particular from 3 to 10% by weight.

The printing inks according to the invention may further contain glycols, alcohols or glycol ether/etherester, as a moistening agent. The glycols used are for example ethylene glycols, propylene glycols or butylene glycols. Preferably 1,2-propylene glycol is used. When the printing inks are used for example in inking mechanisms the presence of moistening agents is absolutely necessary. When the inks are used in inking mechanisms and the like the content of moistening agents can be up to 60% by weight, in general it is from 5 to 40% by weight, preferably from 10 to 30% by weight and in particular from 15 to 25% by weight. When the printing inks are used in lacquering assemblies and the like the content can also be up to 60% by weight, preferably from 0 to 30% by weight, particularly preferably from 0.01 to 15% by weight and particularly preferably from 0.5 to 5% by weight.

In order to improve surface activity the printing inks further contain wetting agents. Sulphosuccinates or polyurethane block copolymers are preferably used as the wetting agents. The content of wetting agents is from 0.1 to 30% by weight. When used in inking mechanism and the like the content is preferably from 0.5 to 15% by weight, particularly preferably from 1 to 8% by weight and in particular from 1 to 3% by weight. When used in lacquering assemblies and the like the content is preferably from 0.1 to 30% by weight, particularly

preferably from 1 to 10% by weight and in particular from 2 to 6% by weight.

To neutralise the acids contained in the copolymer the printing inks according to the invention contain neutralisation agents, in which respect the alkaline substances which are usually employed in such polymers such as amines, ammonia etc. are used for that purpose. The content of neutralisation agents, in dependence on the acid content, is generally from 0.1 to 30% by weight. When used in ink lacquers and the like the content of neutralisation agents can be from 0.5 to 15% by weight, preferably from 1 to 8% by weight and particularly preferably from 1 to 5% by weight. When used in lacquering assemblies and the like the content is generally from 0.1 to 20% by weight, preferably from 1 to 10% by weight and particularly preferably from 5 to 10% by weight. As the foregoing values show, in the case of printing inks which are intended for use in lacquering assemblies, the higher acid number of the acrylates used, that is to say the higher proportions of the corresponding acrylates, means that the amounts used as a neutralisation agent must also be greater.

In order to enhance abrasion resistance the printing inks according to the invention contain natural and/or synthetic waxes. Such waxes are for example polyethylene waxes, carnauba waxes etc. The content thereof is generally from 0.1 to 30% by weight. When used in inking mechanisms and the like the content can be from 0.5 to 15% by weight, preferably from 1 to 8% by weight and particularly preferably from 1 to 5% by weight. For use in lacquering assemblies the content can be from 0.1 to 15% by weight, preferably from 0.1 to 10% by weight and particularly preferably from 0.5 to 5% by weight.

In order to avoid excessive foam formation the printing inks according to the invention contain anti-foam agents, for example the silicone anti-foam agents which are usual for this purpose. The content thereof is generally from 0.001 to 2% by weight. When used in lacquering mechanisms and the like the content is generally from 0.001 to 1% by weight, preferably from 0.005 to 0.15% by weight and particularly preferably from 0.005 to 0.02% by weight. When used in lacquering assemblies and the like the content is generally from 0.005 to 1% by weight, preferably from 0.01 to 0.15% by weight.

The water content of the printing inks according to the invention can fluctuate within wide limits. It is between 0 and 80% by weight. Printing inks for use in inking mechanisms and the like generally contain from 0 to 40% by weight, preferably from 5 to 20% by weight. For use in lacquering assemblies they generally contain from 1 to 70% by weight, preferably from 3 to 30% by weight and particularly preferably from 3 to 20% by weight. The printing inks according to the invention are intended in particular for printing with gold and silver inks. Such inks contain as colouring substances or

pigments the substances which are usual for that purpose, namely metal surface coating dusts, bronze surface coating powders, copper alloys, gold varnish pigments, silver printing inks, and aluminium pigment pastes, possibly with organic dyestuff solutions, mica pigments (iriodine) and the like.

The printing inks according to the invention are suitable for example for use in inking mechanisms of sheet-fed or roll-fed offset machines. In that case for example paper or cardboard can be printed upon in a single working operation with for example a gold ink and lacquered without the gold ink losing brilliance or shine. In that case the printed surface has a higher level of abrasion resistance.

On the other hand the printing ink according to the invention can also be used in separate lacquering assemblies of offset printing machines and the like, such as converted moistening mechanisms, lift moistening mechanisms, alcohol moistening mechanisms, on sizing or lacquering mechanisms in roll-fed offset machines, lacquering machines such as for example Billhöfer and in intaglio or flexographic printing machines.

In accordance with the foregoing details the printing inks according to the invention are of the following composition, the composition being specified hereinafter in parts by weight as the stated amounts do not make up 100% in all cases. The reference to parts by weight relates to the proportion by weight of the component in relation to the sum of the total weight. It will be appreciated that within a composition all details by weight refer to the same units of weight.

The printing inks according to the invention are of the following composition:

from 1 to 60 parts by weight of	styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester, as an aqueous dispersion,
from 1 to 40 parts by weight of	styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0 to 60 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 0.1 to 30 parts by weight of	wetting agent,

from 0.1 to 30 parts by weight of neutralisation agent,

from 0.1 to 30 parts by weight of natural and/or synthetic waxes,

from 0.001 to 2 parts by weight of anti-foam agent,

from 0 to 80 parts by weight of water, and

from 1 to 80 parts by weight of aluminium, mica and/or gold bronze pigments.

For use in inking mechanisms, for example of offset printing machines and the like, the printing inks are of the following composition:

from 1 to 30 parts by weight of styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester, as an aqueous dispersion,

from 5 to 40 parts by weight of styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 5 to 40 parts by weight of glycols or alcohols or glycol ether/etherester,

from 0.5 to 20 parts by weight of wetting agent,

from 0.5 to 15 parts by weight of neutralisation agent,

from 0.5 to 15 parts by weight of waxes,

from 0.001 to 1 part by weight of anti-foam agent,

from 0 to 40 parts by weight of water, and

from 10 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

The following composition is preferred for the same use:

from 5 to 12 parts by weight of styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 10 to 15 parts by weight of styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 10 to 30 parts by weight of glycols or alcohols or glycol ether/etherester,

from 1 to 8 parts by weight of wetting agent,

from 1 to 8 parts by weight of neutralisation agent,

from 1 to 8 parts by weight of waxes,

from 0.005 to 0.15 parts by weight of anti-foam agent,

from 5 to 20 parts by weight of water, and

from 20 to 50 parts by weight of aluminium, mica and/or gold bronze pigments.

In particular the following composition is preferred:

from 6 to 10 parts by weight of styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 10 to 13 parts by weight of styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 15 to 25 parts by weight of glycols or alcohols or glycol ether/etherester,

from 1 to 3 parts by weight of wetting agent,

from 1 to 5 parts by weight of neutralisation agent,

from 1 to 5 parts by weight of waxes,

from 0.005 to 0.02 parts by weight of anti-foam agent,

from 5 to 20 parts by weight of water, and

from 25 to 45 parts by weight of aluminium, mica and/or gold bronze pigments.

In general the following composition is employed for use in lacquering assemblies and the like:

from 1 to 50 parts by weight of styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 1 to 40 parts by weight of styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 0 to 30 parts by weight of glycols or alcohols or glycol ether/etherester,

from 0.1 to 30 parts by weight of wetting agent,

from 0.1 to 20 parts by weight of neutralisation agent,

from 0.1 to 15 parts by weight of waxes,

from 0.005 to 1 part by weight of anti-foam agent,

from 1 to 70 parts by weight of water, and

from 10 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

The following composition is preferred for that use:

from 3 to 30 parts by weight of styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 3 to 30 parts by weight of styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid

resins,

from 0.01 to 15 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 1 to 20 parts by weight of	wetting agent,
from 1 to 10 parts by weight of	neutralisation agent,
from 0.1 to 10 parts by weight of	waxes,
from 0.01 to 0.15 parts by weight of	anti-foam agent,
from 3 to 30 parts by weight of	water, and
from 20 to 50 parts by weight of	aluminium, mica and/or gold bronze pigments.

The following composition is particularly preferred for that use:

from 25 to 30 parts by weight of	styrene-methacrylic acid ester copolymer or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 20 to 25 parts by weight of	styrene-methacrylic acid ester copolymer or vinyl propionate/vinyl pyrrolidone copolymers or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0.5 to 5 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 2 to 6 parts by weight of	wetting agent,
from 5 to 10 parts by weight of	neutralisation agent,
from 0.5 to 5 parts by weight of	waxes,
from 0.01 to 0.15 parts by weight of	anti-foam agent,
from 3 to 20 parts by weight of	water, and
from 40 to 50 parts by weight of	aluminium, mica and/or gold bronze pigments.

The printing inks according to the invention can be used for

printing on paper, cardboard, cardboard packaging and the like, wherein the printing ink is applied for example by way of an inking mechanism of a sheet-fed or roll-fed offset machine in a single working operation without subsequent lacquering. The printing ink can also be applied from moistening mechanisms, separate lacquering assemblies of sheet-fed or roll-fed offset printing machines, sheet lacquering machines, intaglio or flexographic printing machines in a single working operation without subsequent lacquering.

The invention is described in greater detail hereinafter by means of examples:

Example 1

A printing ink of the following composition is produced by mixing the constituents:

	Parts by wt.
acrylate-styrene-copolymer (molar weight 200,000) acid number 90, aqueous dispersion	8
acrylate-styrene-copolymer (molar weight 1,000-40,000) acid number 200, solid resin	12
wetting agent	2
alcohols and glycols	20
DEA/NH_3-neutralisation agent	3
waxes	2
anti-foam agent	0.01
pigments/dyestuffs	3
water	10
aluminium pigment paste (65% Al) for use in the aqueous range	40

The printing ink is applied to paper by way of the inking mechanism of a sheet-fed offset machine in a single working operation without subsequent lacquering. The printing result shows no loss of shine and brilliance and its resistance to abrasion is high.

Example 2

A water ink of the following composition is produced by mixing the constituents:

	Parts by wt.
acrylate-styrene-copolymer (molar weight 200,000) acid number 90	-
acrylate-styrene-copolymer (molar weight 1,000 to 40,000)	

acid number 200	15
wetting agent	3
alcohols and glycols	1
amines and NH_3	5
waxes	1
anti-foam agent	0.05
water	42
aluminium pigment paste (65% Al)	30
dyestuffs/pigments	3

The ink is applied to paper with a sheet lacquering machine. It exhibited no loss of shine and brilliance and the resistance to abrasion was good.

Example 3

A printing ink of the following composition was produced by mixing the constituents:

	Parts by wt.
methyl methacrylate ester, aqueous dispersion (worléecryl 8415 from Worlée)	5.0
vinyl propionate-vinyl pyrrolidone-copolymer-solid resin (collacral VL from BASF) acid number	7
wetting agent polyurethane block copolymer (disperbyk 182 from Byk)	15
alcohols and glycols	25
DEA/NH_3-neutralisation agent	3
waxes	2
anti-foam agent	0.01
pigments/dyestuffs	3
water	10
aluminium pigment paste (65% Al) for use in the aqueous range	30

The printing ink was applied to paper with a sheet-fed lacquering machine. It exhibited no loss of shine and brilliance and the resistance to abrasion was good.

Example 4

A printing ink of the following composition was produced by mixing the constituents:

	Parts by wt.
methyl methacrylate ester, aqueous dispersion (worléecryl 8415 from Worlée)	8
vinyl propionate-vinyl pyrrolidone-copolymer-solid resin (collacral VL from BASF) acid number	7
wetting agent (Disperbyk 182)	15
alcohols and glycols	20

DEA/NH_3	1
waxes	2
anti-foam agent	0.01
pigments/dyestuffs	3
gold bronze printing surface coating	45

The printing ink was applied to paper with a sheet-fed lacquering machine. It exhibited no loss of shine and brilliance and the abrasion resistance was good.

Example 5

When the vinyl propionate-vinyl pyrrolidone was replaced by methyl methacrylate ester the same results are achieved.

Example 6

A water ink of the following composition is produced by mixing the constituents:

	Parts by wt.
methyl methacrylate ester, aqueous dispersion (worléecryl 8415 from Worlée)	4.5
methyl methacrylate ester, solid resin (Zinpol 146 from Worlée)	6.3
wetting agent polyurethane	13.5
alcohols and glycols	22.5
amines and NH_3	2
waxes	2
anti-foam agent	0.01
water	19
aluminium pigment paste (65% Al)	27
dyestuff/pigments	3.2

The ink was applied to paper with a sheet-fed lacquering machine. It exhibited no loss of shine and brilliance and the resistance to abrasion was good.

Example 7

A water ink of the following composition is produced by mixing the constituents:

	Parts by wt.
methyl methacrylate ester, aqueous dispersion (worléecryl 8415 from Worlée)	7.2
methyl methacrylate ester, solid resin (Zinpol 146 from Worlée)	6.3
wetting agent	13
alcohols and glycols	18
amines and NH_3	1
waxes	2
anti-foam agent	0.01

water	7.5
dyestuff/pigments	3
gold bronze printing surface coating	42

The ink was applied to paper with a sheet-fed lacquering machine. It exhibited no loss of shine and brilliance and the resistance to abrasion was good.

CLAIMS

1. A water-based printing ink, in particular for gold and silver inks, containing:

from 1 to 60 parts by weight of	styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester, as an aqueous dispersion,
from 1 to 40 parts by weight of	styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0 to 60 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 0.1 to 30 parts by weight of	wetting agent,
from 0.1 to 30 parts by weight of	neutralisation agent,
from 0.1 to 30 parts by weight of	natural and/or synthetic waxes,
from 0.001 to 2 parts by weight of	anti-foam agent,
from 0 to 80 parts by weight of	water, and

from 1 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

2. A printing ink according to claim 1, in particular for use in inking mechanisms, for example of offset printing machines and the like, containing:

from 1 to 30 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester, as an aqueous dispersion,

from 5 to 40 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 5 to 40 parts by weight of glycols or alcohols or glycol ether/etherester,

from 0.5 to 20 parts by weight of wetting agent,

from 0.5 to 15 parts by weight of neutralisation agent,

from 0.5 to 15 parts by weight of waxes,

from 0.001 to 1 part by weight of anti-foam agent,

from 0 to 40 parts by weight of water, and

from 10 to 60 parts by weight of	aluminium, mica and/or gold bronze pigments.

3. A printing ink according to claim 1 or claim 2, containing:

from 5 to 12 parts by weight of	styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 10 to 15 parts by weight of	styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 10 to 30 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 1 to 8 parts by weight of	wetting agent,
from 1 to 8 parts by weight of	neutralisation agent,
from 1 to 8 parts by weight of	waxes,
from 0.005 to 0.15 parts by weight of	anti-foam agent,
from 5 to 20 parts by weight of	water, and
from 20 to 50 parts by weight of	aluminium, mica and/or gold bronze pigments.

4. A printing ink according to claim 1 or 3 containing:

from 6 to 10 parts by weight of	styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 11 to 13 parts by weight of	styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 15 to 25 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 1 to 3 parts by weight of	wetting agent,
from 1 to 5 parts by weight of	neutralisation agent,
from 1 to 3 parts by weight of	waxes,
from 0.005 to 0.02 parts by weight of	anti-foam agent,
from 5 to 20 parts by weight of	water, and
from 25 to 45 parts by weight of	aluminium, mica and/or gold bronze pigments.

5. A printing ink according to claim 1, in particular for use in lacquering assemblies and the like, containing:

from 1 to 50 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 1 to 40 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,

from 0 to 30 parts by weight of glycols or alcohols or glycol ether/etherester,

from 0.1 to 30 parts by weight of wetting agent,

from 0.1 to 20 parts by weight of neutralisation agent,

from 0.1 to 15 parts by weight of waxes,

from 0.005 to 1 part by weight of anti-foam agent,

from 1 to 70 parts by weight of water, and

from 10 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

6. A printing ink according to claim 1 or claim 5, containing:

from 3 to 30 parts by weight of styrene-methacrylic

	acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 3 to 30 parts by weight of	styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0.01 to 15 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 1 to 10 parts by weight of	wetting agent,
from 1 to 10 parts by weight of	neutralisation agent,
from 0.1 to 10 parts by weight of	waxes,
from 0.01 to 0.15 parts by weight of	anti-foam agent,
from 3 to 30 parts by weight of	water, and
from 20 to 50 parts by weight of	aluminium, mica and/or gold bronze pigments.

7. A printing ink according to claim 1 or claim 6, containing:

from 25 to 30 parts by weight of	styrene-methacrylic acid ester copolymer

	and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 3 to 25 parts by weight of	styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0.5 to 5 parts by weight of	glycols or alcohols or glycol ether/etherester,
from 2 to 6 parts by weight of	wetting agent,
from 5 to 10 parts by weight of	neutralisation agent,
from 0.5 to 5 parts by weight of	waxes,
from 0.01 to 0.15 parts by weight of	anti-foam agent,
from 3 to 20 parts by weight of	water, and
from 40 to 50 parts by weight of	aluminium, mica and/or gold bronze pigments.

8. A method of printing on paper, cardboard, cardboard packaging and the like using the printing ink according to claims 1 to 4 characterised in that the printing ink is applied by way of an inking mechanism of a sheet-fed or roll-fed offset machine in a single working operation without subsequent lacquering.

9. A method of printing on paper, cardboard, cardboard packaging and the like using the printing ink according to claims 1 and 5 to 7 characterised in that the printing ink is applied from moistening mechanisms, separate lacquering assemblies of sheet-fed or roll-fed offset printing machines, sheet lacquering machines, intaglio or flexographic printing machines in a single working operation without subsequent lacquering.

(12) UK Patent Application (19) GB (11) 2 093 375 A

(21) Application No 8136785
(22) Date of filing 7 Dec 1981
(30) Priority data
(31) 3046257
(32) 8 Dec 1980
(33) Fed. Rep. of Germany (DE)
(43) Application published
2 Sep 1982
(51) INT CL³
B05C 1/08
(52) Domestic classification
B2L 106A 126 162 204
207 B
(56) Documents cited
GB 1492962
GB 1444305
(58) Field of search
B2L

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(54) Varnishing unit for a printing press

(57) The varnishing unit includes a supply tank (1), a fountain roller (2) and a metering roller (3) which feed a dosed quantity of varnish to distributor (4) and form (5) rollers. At least two wiper rollers (7), which can be adjusted against the fountain roller (2) are provided upstream of the contact point of the metering roller (3) and fountain roller (2). These wiper rollers allow a size-related varnish supply to be provided on the fountain roller (2). The metering roller (3), which is in contact with the fountain roller (2) may be wiped off by means of the wiper blade (6), and the wiped off varnish may be fed to the varnish tank (1). Variation of the varnish supply to match the desired format can be achieved by varying the inclination of the wiper rollers (7).

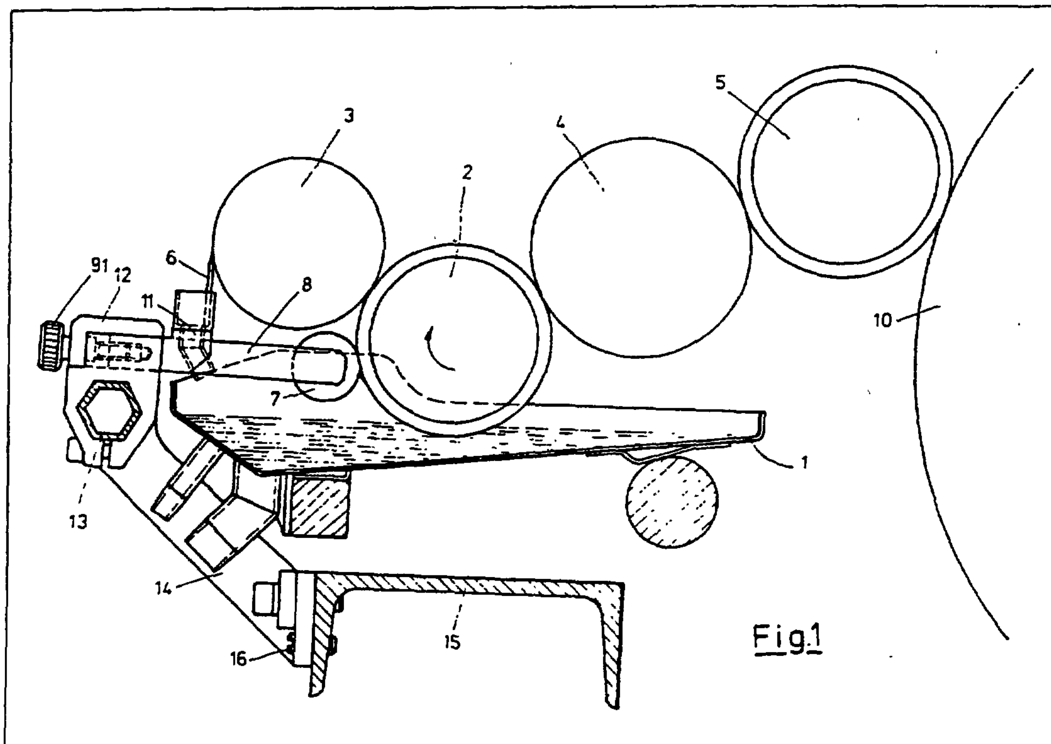

Fig.1

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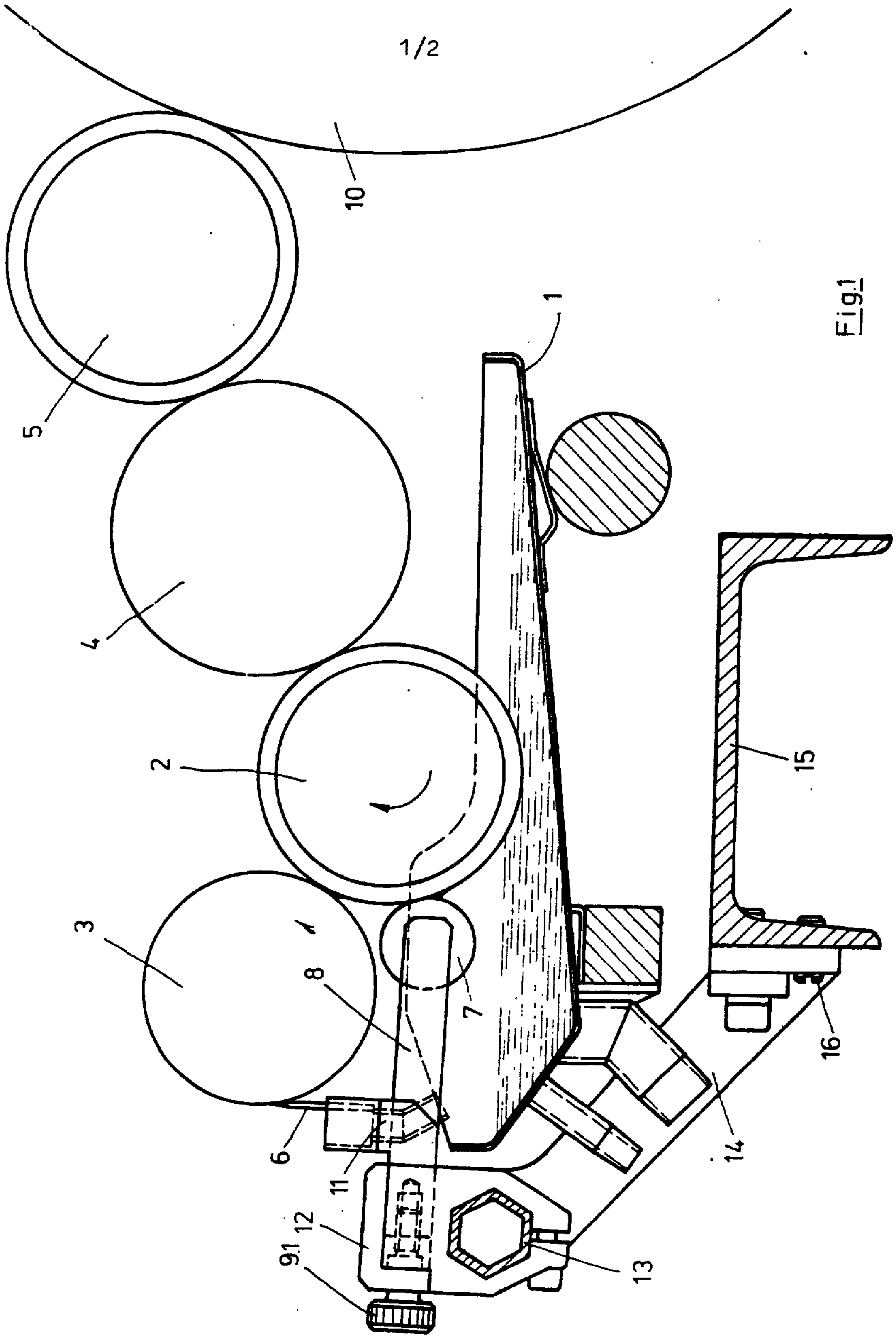

Fig.1

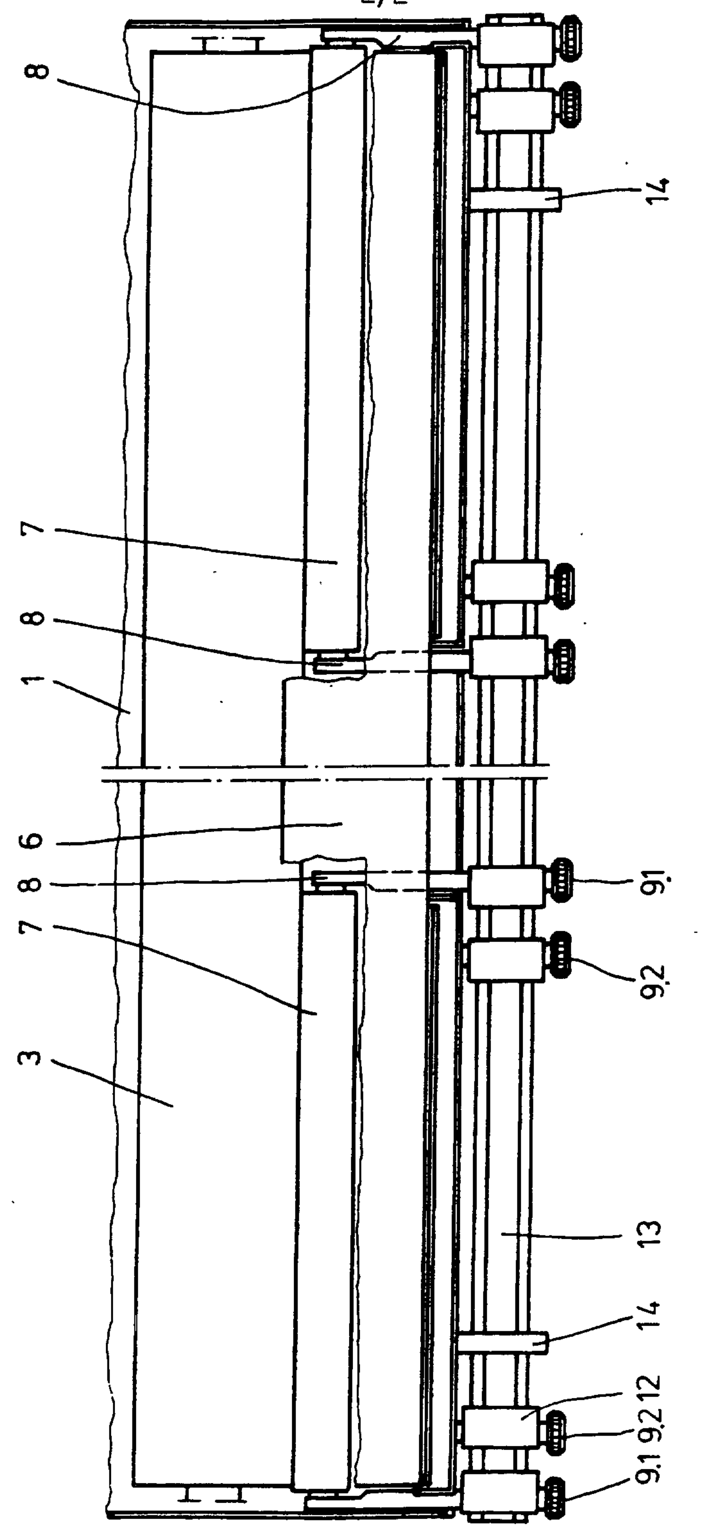

Fig. 2

SPECIFICATION

Varnishing unit for use on a printing press

This invention relates to a varnishing unit for use on a printing press, particularly to such a unit comprising a varnish supply tank and a fountain roller which is partially immersed in the tank, the quantity of varnish collected by the fountain roller being controlled by a metering roller and fed to a distributor roller and form roller.

The use of the final printing unit in a printing press as a varnishing unit has proved to be an effective method when varnishing printed sheets in one machine pass. If a so-called damping fountain varnish is used, varnishing can be performed by the damping unit without additional equipment. The varnish is then metered by the damping unit to the printing plate like the damping solution.

United States Patent Specification 3,552,311 describes an arrangement for the supply of a liquid in a printing press. With this arrangement the liquid is metered by inclination of a roller, a wider or narrower zone without damping solution resulting according to the position of the roller. The particular disadvantage of this arrangement is that metered application of varnish on the printing plate is not possible. It is likewise not possible to apply varnish over certain areas only, dependent on the format of the material to be varnished.

According to the present invention, there is provided a printing press comprising a varnish supply tank, a fountain roller partially immersed in the tank, and a distributor roller in contact with the fountain roller, and a form roller in contact with the distributor roller, and wherein the unit contains at least two wiper rollers which can be placed against the fountain roller, can adjust the format of the varnish supply depending on their position, and are located upstream of the contact point of the metering roller with the fountain roller, and a wiper blade adapted to be brought into contact with the metering roller and adapted to remove varnish on the metering roller and return it to the varnish supply tank.

In such a press the varnish supply is initially adjusted to the sheet size or subject by adjusting the position or inclination of the wiper rollers and then the actual metering of the quantity of varnish is effected. The metering can be carried out without affecting the varnish-free areas, because the varnish has previously been removed from the metering roller in such areas.

In a preferred embodiment of the invention, several inclinable wiper rollers are provided across the width of the varnishing unit. Consequently there is the additional advantage that not only size-related, but also subject-related application of varnish is possible.

One embodiment of the invention is explained in more detail below by way of example and with reference to the accompanying drawings in which:

Figure 1 shows a side view of a varnishing unit on a printing press, partially in section, and

Figure 2 is a plan view of the varnishing unit shown in Figure 1.

The basic roller arrangement of the varnishing unit shown in the drawings corresponds to that of a known continuously operating damping unit, and consists of a fountain roller 2, which is partially immersed in a varnish supply tank 1, a metering roller 3, which can be placed against the fountain roller 2, a distributor roller 4 and form roller 5, which rests against a varnishing cylinder 10.

In accordance with the invention, wiper rollers 7, which can be placed against the fountain roller 2 and permit size-related metering of the varnish, are also provided. A wiper blade 6 extending over the length of the metering roller 3 can be placed against the latter and actuated via adjusters 9.2.

The varnish is metered according to two criteria:

1) the quantity of varnish for the varnish coating (coating thickness), and

2) the size-related metering of the varnish.

The varnish for the coating is metered by the metering roller 3, which can be placed against the fountain roller 2. To prevent reactions on the metering, the quantity of varnish on the metering roller 3 upstream of the nip between the fountain roller 2 and metering roller 3 is removed by the wiper blade 6 and fed back to the varnish supply tank 1 via a return channel 11. This removal ensures that the same quantity of fresh varnish always reaches the distributor roller 4 and thus the form roller 5.

Size-related metering of the varnish is effected by at least two wiper rollers 7, which can be placed against the fountain roller 2 and are mounted in such a way that they can be inclined to the fountain roller 2. Consequently the varnish can be supplied in such a way that only a partial area of the fountain roller 2 carries varnish. Subject-related varnish supply is also possible if more than two wiper rollers 7 are used.

To ensure that size-related metering is possible even before the quantity of varnish is metered, the wiper rollers 7 are arranged upstream of the point of contact between the fountain roller 2 and the metering roller 3.

For adjustment of the wiper rollers 7 in relation to the fountain roller 2, the wiper rollers 7 are mounted on carrier arms 8, which are adjustable in relation to the fountain roller 2. The carrier arms can be actuated, for example, by adjusters 9.1.

To retain flexibility with size-related metering, it is advantageous to guide the carrier arms 8 in holders 12 which can be moved on a cross-beam 13.

To permit subsequent attachment of the equipment required for metering the varnish to an existing printing press, the cross-beam 13 is mounted in carrier arms 14, which can be bolted on to an already existing frame cross-beam 15. To ensure easier and accurately adjusted positioning of the carrier arms 14, locating pins 16 are provided on the frame cross-beam 15.

CLAIMS

1. A varnishing unit for use on a printing press,

comprising a varnish supply tank, a fountain roller partially immersed in the tank, a metering roller and a distributor roller in contact with the fountain roller, and a form roller in contact with the distributor roller, and wherein the unit contains at least two wiper rollers which can be placed against the fountain roller, can adjust the format of the varnish supply depending on their position, and are located upstream of the contact point of the metering roller with the fountain roller and a wiper blade adapted to be brought into contact with the metering roller and adapted to remove varnish on the metering roller and return it to the varnish supply tank.

2. A varnishing unit according to claim 1 and including means to adjust the inclination of the wiper rollers, the means including carrier arms on which the rollers are mounted, and adjusters acting on the carrier arms to vary their positions.

3. A varnishing unit according to claim 1 or 2 wherein the wiper blade which can be placed against the metering roller extends across the full length of the metering roller.

4. A varnishing unit according to any one of claims 1 to 3 and including means for adjusting the position of the wiper rollers axially relative to the fountain roller.

5. A varnishing unit for a printing press substantially as hereinbefore described with reference to the accompanying drawings.

6. A printing press including a varnishing unit according to any one of the preceding claims.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1982. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Veröffentlichungsnummer: **0 543 385 B1**

EUROPÄISCHE PATENTSCHRIFT

Veröffentlichungstag der Patentschrift: **18.01.95**

(51) Int. Cl.[5] **C09D 11/10, B41M 1/22**

Anmeldenummer: **92119749.7**

Anmeldetag: **19.11.92**

(54) **Drucklack auf Wasserbasis.**

(30) Priorität: **19.11.91 DE 4138073**

(43) Veröffentlichungstag der Anmeldung:
26.05.93 Patentblatt 93/21

(45) Bekanntmachung des Hinweises auf die Patenterteilung:
18.01.95 Patentblatt 95/03

(84) Benannte Vertragsstaaten:
AT BE CH DE DK ES FR GB GR IT LI LU MC NL PT SE

(56) Entgegenhaltungen:
US-A- 3 560 417

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EP 0 543 385 B1

Beschreibung

Die vorliegende Erfindung betrifft einen neuartigen Drucklack auf Wasserbasis, der insbesondere für Gold- und Silberfarben geeignet ist.

Das Bedrucken von Papier oder Kartonagen mit Gold- bzw. Silberfarben ist schwierig, insbesondere, wenn Offset-Druckverfahren verwendet werden sollen. Im allgemeinen wird so vorgegangen, daß in einem zusätzlichen Arbeitsgang eine Broncier-Unterdruckfarbe maschinell auf den Druckbogen aufgetragen wird. Auf diese Farbe wird anschließend auf eine Bronciermaschine im gleichen Arbeitsgang ein Bronzepulver eingestäubt. Durch die nachfolgende Farbtrocknung wird der sogenannte Bronzeschliff auf dem Druckbogen gebunden. Nach der Trocknung wird der Druckbogen mit Lösungsmittel- Wasser- oder UV-Lack überlakkiert, um die mehr oder minder losen Bronzeteilchen zu fixieren.

Ein Nachteil dieser Vorgehensweise ist, daß zur Fixierung des Metallschliffes ein zusätzlicher Lackiervorgang erforderlich ist. Die verwendeten Metallschliffstäube können außerdem zu einer Gesundheitsgefährdung am Arbeitsplatz führen. Auch ist eine Verschmutzung der Maschinen und Druckprodukte in der Druckerei in Kauf zu nehmen. Trotzdem ist diese recht umständliche Vorgehensweise bisher verwendet worden, da das Druckergebnis von hoher optischer Qualität ist.

Bei der Verwendung von Goldfirnisfarben wird eine Ein- oder Zwei-Komponenten-Goldfarbe beispielsweise mittels einer Bogenoffset-Maschine Naß-in-Naß auf den Druckbogen aufgebracht. Da die Druckbögen im allgemeinen anschließend direkt weiterverarbeitet werden, ist auch hierbei eine nachträgliche Lackierung erforderlich, um eine gute Scheuerfestigkeit zu erzielen.

Bei dieser Naß-in-Naß-Auftragsweise ist ein durch die Lackierung hervorgerufener Verlust an Brillanz der Goldfarben nachteilig. Außerdem neigt der Metallschliff der Goldfarbe durch Feuchtigkeitsaufnahme zur Oxidation, was zu einem Glanzverlust sowie zu einer Farbtonveränderung im Sinne einer Schwärzung führt.

Auch bei Silberdruckfarben treten ähnliche Probleme wie bei den Goldfarben auf. Auch hier ist die Scheuerfestigkeit nur dann befriedigend, wenn eine nachträgliche Lackierung durchgeführt wird.

Aufgabe der vorliegenden Erfindung ist die Schaffung von Druckfarben auf Wasserbasis, mit denen Gold- und Silberfarben, Bronzen und dergleichen in einem einzigen Arbeitsgang aufgetragen werden können, ohne daß nachteilige Farbtonveränderungen, Verlust an Brillanz und Glanz auftreten, die eine hohe Scheuerfestigkeit aufweisen und in den unterschiedlichsten Druckverfahren Verwendung finden können.

Gelöst wird diese Aufgabe durch einen Drucklack gemäß dem Hauptanspruch, wobei die Unteransprüche bevorzugte Ausgestaltungen der Erfindung wiedergeben. Die Verfahrensansprüche betreffen Druckverfahren, in denen sich die erfindungsgemäßen Drucklacke einsetzen lassen.

Die erfindungsgemäßen Drucklacke sind auf der Grundlage von Styrol-Methacrylsäureester-Copolymeren, Vinylpropionat-Vinylpyrrolidon-Copolymeren und/oder Methacrylatestern konzipiert. Solche Copolymere sind bekannt, es ist aber überraschend, daß im Gegensatz zu anderen Polymeren für wäßrige Lacke bei Styrol-Methacrylester-Copolymeren beim Einsatz von Gold- oder Silberfarben die oben erwähnten Nachteile, insbesondere Verlust an Brillanz und Glanz sowie mangelnde Abriebfestigkeit, nicht auftreten. Somit eröffnen die erfindungsgemäßen Drucklacke erstmals die Möglichkeit, Gold- und Silberfarben in wäßrigen Lacken in einem einzigen Arbeitsgang mit den unterschiedlichsten Druckmaschinen zu verarbeiten.

Die erfindungsgemäßen Styrol-Methacrylsäureester-Copolymeren enthalten etwa 60 bis 95 Gew.-% Styrol und etwa 5 bis 40 Gew.-% Methacrylsäureester, bezogen auf die Gesamtmenge der Polymeren. Bevorzugt ist eine Zusammensetzung, die etwa 70 bis 90 Gew.-% Styrol und etwa 10 bis 30 Gew.-% Methacrylsäureester enthält. Als Methacrylsäureester werden die Ester von Methacrylsäure mit Alkoholen mit 1 bis 4 Kohlenstoffatomen bevorzugt, insbesondere werden die Methylester verwendet. Die in den erfindungsgemäßen Drucklacken verwendeten Copolymeren werden sowohl in Form wäßriger Dispersion als auch in Form von Festharz eingesetzt. In den wäßrigen Dispersionen haben die Copolymeren wohl Gewichte von mehr als 100.000, bevorzugt von mehr als 200.000, ihre Säurezahl liegt unter 150, bevorzugt unter 100, und insbesondere zwischen 70 und 100. Der Wassergehalt solcher wäßrigen Copolymerdispersionen liegt zwischen 60 und 50 Gew.-%.

Die als Festharz eingesetzten Copolymeren weisen Mol-Gewichte unter 100.000 auf, bevorzugt unter 50.000. Ihre Säurezahl liegt über 150, bevorzugt im Bereich von 150 bis 300 und besonders bevorzugt im Bereich von 150 bis 250. Der Wassergehalt dieser Festharze ist so gering, daß er vernachlässigt werden kann.

Die erfindungsgemäßen Drucklacke können 1 bis 60 Gew.-% einer wäßrigen Dispersion von Styrol-Methacrylsäureester-Copolymer enthalten.

Beim Einsatz in Farbwerken von Offset-Druckmaschinen und dergleichen und ähnlichen Vorrichtungen, bei denen eine hohe Viskosität erwünscht ist, beträgt der Gehalt an wäßriger Dispersion im allgemeinen 1 bis 30 Gew.-%, bevorzugt 5 bis 12 Gew.-% und insbesondere 6 bis 10 Gew.-%.

An Styrol-Methacrylsäureester-Copolymer in Form von Festharz werden 1 bis 40 Gew.-% eingesetzt, beim Einsatz in Farbwerken, z.B. von Offset-Druckmaschinen und dergleichen oder ähnlichen Vorrichtungen, beträgt der Gehalt an Festharz insbesondere 5 bis 40 Gew.-%, bevorzugt 10 bis 15 Gew.-% und besonders bevorzugt 10 bis 12 Gew.-%.

Das als Festharz eingesetzte StyrolMethacrylsäureester-Copolymer kann ganz oder teilweise durch Vinylpropionat-Vinylpyrrolidon-Copolymer oder Methacrylatester von Alkoholen mit 1 bis 4 Kohlenstoffatomen ersetzt werden, wobei die eingesetzte Gesamtmenge unverändert bleibt.

Beim Einsatz der erfindungsgemäßen Lacke in Lackieraggregaten, Lackiermaschinen, separaten Lackierwerken bzw. Leim oder Lackierwerken von Rollenoffset-Maschinen sollten die Lacke im allgemeinen eine niedrigere Viskosität aufweisen. Demgemäß sind auch die Gehalte bei diesem Anwendungszweck unterschiedlich von dem weiter oben genannten. Der Gehalt an wäßriger Dispersion beträgt bei diesem Anwendungszweck im allgemeinen 1 bis 50 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 25 bis 30 Gew.-%. Der Gehalt an Festharz beträgt im allgemeinen 1 bis 40 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 3 bis 25 Gew.-%, insbesondere 3 bis 10 Gew.-%.

Die erfindungsgemäßen Drucklacke können weiterhin Glykole, Alkohole oder Glykolether/etherester als Feuchthaltemittel enthalten. Als Glykole werden beispielsweise Ethylenglykole, Propylenglykole, oder Butylenglykole eingesetzt. Bevorzugt wird 1,2-Propylenglykol verwendet. Bei der Verwendung der Drucklacke beispielsweise in Farbwerken ist die Anwesenheit von Feuchthaltemitteln zwingend erforderlich. Der Gehalt an Feuchthaltemitteln kann beim Einsatz in Farbwerken und dergleichen bis 60 Gew.-% betragen, im allgemeinen beträgt er 5 bis 40 Gew.-%, bevorzugt 10 bis 30 Gew.-% und insbesondere 15 bis 25 Gew.-%. Beim Einsatz der Drucklacke in Lackieraggregaten und dergleichen kann der Gehalt ebenfalls bis zu 60 Gew.-% betragen, bevorzugt 0 bis 30 Gew.-%, besonders bevorzugt 0,01 bis 15 Gew.-% und insbesondere bevorzugt 0,5 bis 5 Gew.-%.

Zur Verbesserung der Oberflächenaktivität enthalten die Drucklacke weiterhin Netzmittel. Als Netzmittel werden vorzugsweise Sulfosuccinate oder Polyurethan-Blockcopolymere verwendet. Der Gehalt an Netzmitteln beträgt 0,1 bis 30 Gew.-%. Beim Einsatz in Farbwerken und dergleichen beträgt der Gehalt vorzugsweise 0,5 bis 15 Gew.-%, besonders bevorzugt 1 bis 8 Gew.-% und insbesondere 1 bis 3 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt bevorzugt 0,1 bis 30 Gew.-%, besonders bevorzugt 1 bis 10 Gew.-% und insbesondere 2 bis 6 Gew.-%.

Zur Neutralisation der im Copolymer enthaltenen Säuren enthalten die erfindungsgemäßen Drucklacke Neutralisationsmittel, wobei hierfür die üblicherweise in solchen Polymeren verwendeten alkalischen Stoffe, wie Amine, Ammoniak usw. verwendet werden. Der Gehalt an Neutralisationsmitteln beträgt in Abhängigkeit vom Säuregehalt im allgemeinen 0,1 bis 30 Gew.-%. Beim Einsatz in Farblacken und dergleichen kann der Gehalt an Neutralisationsmitteln 0,5 bis 15 Gew.-% betragen, bevorzugt 1 bis 8 Gew.-% und besonders bevorzugt 1 bis 5 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt im allgemeinen 0,1 bis 20 Gew.-%, bevorzugt 1 bis 10 Gew.-% und besonders bevorzugt 5 bis 10 Gew.-%. Wie die obigen Werte zeigen, müssen bei Drucklacken, die für die Verwendung in Lackieraggregaten gedacht sind, wegen der höheren Säurezahl der eingesetzten Acrylate, d.h. wegen der höheren Anteile der entsprechenden Acrylate, auch die als Neutralisationsmittel eingesetzten Mengen größer sein.

Zur Erhöhung der Abriebfestigkeit enthalten die erfindungsgemäßen Drucklacke natürliche und/oder synthetische Wachse. Solche Wachse sind beispielsweise Polyethylenwachse, Carnaubawachse usw.. Ihr Gehalt beträgt im allgemeinen 0,1 bis 30 Gew.-%. Beim Einsatz in Farbwerken und dergleichen kann der Gehalt 0,5 bis 15 Gew.-% betragen, bevorzugt 1 bis 8 Gew.-% und besonders bevorzugt 1 bis 5 Gew.-%. Beim Einsatz in Lackieraggregaten kann der Gehalt 0,1 bis 15 Gew.-% betragen, bevorzugt 0,1 bis 10 Gew.-% und besonders bevorzugt 0,5 bis 5 Gew.-%.

Zur Vermeidung einer übermäßigen Schaumbildung enthalten die erfindungsgemäßen Drucklacke Entschäumer, beispielsweise die für diesen Zweck üblichen Silikonentschäumer. Ihr Gehalt beträgt im allgemeinen 0,001 bis 2 Gew.-%. Beim Einsatz in Lackierwerken und dergleichen beträgt der Gehalt im allgemeinen 0,001 bis 1 Gew.-%, bevorzugt 0,005 bis 0,15 Gew.-% und besonders bevorzugt 0,005 bis 0,02 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt im allgemeinen 0,005 bis 1 Gew.-%, bevorzugt 0,01 bis 0,15 Gew.-%.

Der Wassergehalt der erfindungsgemäßen Drucklacke kann in weiten Grenzen schwanken. Er liegt zwischen 0 bis 80 Gew.-%. Drucklacke für den Einsatz in Farbwerken und dergleichen enthalten im allgemeinen 0 bis 40 Gew.-%, bevorzugt 5 bis 20 Gew.-%. Für den Einsatz in Lackieraggregaten enthalten sie im allgemeinen 1 bis 70 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 3 bis 20 Gew.-%. Die erfindungsgemäßen Drucklacke sind insbesondere für das Drucken mit Gold- und Silberfarben gedacht. Solche Lacke enthalten als Farbstoffe bzw. Pigmente die hierfür üblichen Metallschliffstäube, Bronzeschliffpulver, Kupferlegierungen, Goldfirnispigmente, Silberdruckfarben, Aluminiumpigmentpasten,

eventuell mit organischen Farbstofflösungen, Glimmerpigmente (Iriodine) und dergleichen.

Die erfindungsgemäßen Drucklacke eignen sich beispielsweise für den Einsatz in Farbwerken von Bogen- oder Rollenoffset-Maschinen. Dabei läßt sich beispielsweise Papier oder Karton in einem einzigen Arbeitsgang mit beispielsweise einer Goldfarbe bedrucken und lackieren, ohne daß die Goldfarbe an Brillanz oder Glanz verliert. Dabei weist die bedruckte Oberfläche eine höhere Scheuerfestigkeit auf.

Andererseits läßt sich der erfindungsgemäße Drucklack auch in separaten Lackieraggregaten von Offset-Druckmaschinen und dergleichen, wie umgebaute Feuchtwerke, Hebefeuchtwerke, Alkoholfeuchtwerke, auf Leim- oder Lackwerken in Rollenoffset-Maschinen, Lackiermaschinen, wie z.B Billhöfer sowie in Tief- oder Flexodruck-Maschinen einsetzen.

Entsprechend den obigen Angaben weisen die erfindungsgemäßen Drucklacke folgende Zusammensetzung auf, wobei die Zusammensetzung im folgenden in Gewichts-Teilen (Gew.-Teilen) angegeben wird, da sich die angegebenen Mengen nicht in allen Fällen zu 100% ergänzen. Die Angabe der Gew.-Teile bezieht sich auf den Gew.-Anteil des Bestandteils an der Summe des Gesamtgewichts. Es versteht sich, daß innerhalb einer Rezeptur alle Gew.-Angaben sich auf gleiche Gew.-Einheiten beziehen.

Die erfindungsgemäßen Drucklacke haben die folgende Zusammensetzung:

1 bis 60 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion

1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,

0 bis 60 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester

0,1 bis 30 Gew.-Teile Netzmittel

0,1 bis 30 Gew.-Teile Neutralisationsmittel

0,1 bis 30 Gew.-Teile natürliche und/oder synthetische Wachse

0,001 bis 2 Gew.-Teile Entschäumer

0 bis 80 Gew.-Teile Wasser

1 bis 80 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente

Für den Einsatz in Farbwerken, beispielsweise von Offset-Druckmaschinen und dergleichen haben die Drucklacke die folgende Zusammensetzung:

1 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,

5 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymer oder C_{1-4}-Methacrylatester als neutralisierbare wasserlösliche Festharze,

5 bis 40 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester

0,5 bis 20 Gew.-Teile Netzmittel

0,5 bis 15 Gew.-Teile Neutralisationsmittel,

0,5 bis 15 Gew.-Teile Wachse

0,001 bis 1 Gew.-Teil Entschäumer

0 bis 40 Gew.-Teile Wasser

10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Für den gleichen Einsatz ist folgende Zusammensetzung bevorzugt:

5 bis 12 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methyacrylatester, als wäßrige Dispersion

10 bis 15 Gew.-Teile Strvrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutraliserbare wasserlösliche Festharze

10 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester

1 bis 8 Gew.-Teile Netzmittel

1 bis 8 Gew.-Teile Neutralisationsmittel

1 bis 8 Gew.-Teile Wachse

0,005 bis 0,15 Gew.-Teile Entschäumer

5 bis 20 Gew.-Teile Wasser

20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente

Insbesondere ist folgende Zusammensetzung bevorzugt:

6 bis 10 Gew.-Teile Styrol-Methacrylsäureester-Copolymer` oder C_1-C_4-Methacrylatester, als wäßrige Dispersion

10 bis 13 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vnylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze

15 bis 25 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester

1 bis 3 Gew.-Teile Netzmittel

1 bis 5 Gew.-Teile Neutralisationsmittel
1 bis 5 Gew.-Teile Wachse
0,005 bis 0,02 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
25 bis 45 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Für den Einsatz in Lackieraggregaten und dergleichen wird im allgemeinen folgende Zusammensetzung verwendet:

1 bis 50 Gew.-Teile Stryrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion
1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymer oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze
0 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew.-Teile Netzmittel
0,1 bis 20 Gew.-Teile Neutralisationsmittel
0,1 bis 15 Gew.-Teile Wachse
0,005 bis 1 Gew.-Teile Entschäumer
1 bis 70 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Bevorzugt ist für diesen Einsatz die folgende Zusammensetzung:

3 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion
3 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymer oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze
0,01 bis 15 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 20 Gew.-Teile Netzmittel
1 bis 10 Gew.-Teile Neutralisationsmittel
0,1 bis 10 Gew.-Teile Wachse
0,01 bis 0,15 Gew.-Teile Entschäumer
3 bis 30 Gew.-Teile Wasser
20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Besonders bevorzugt ist für diesen Einsatz die folgende Zusammensetzung:

25 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion
20 bis 25 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze
0,5 bis 5 Gew.-Teile Glykole oder Alkohole oder Glykolether/ etherester
2 bis 6 Gew.-Teile Netzmittel
5 bis 10 Gew.-Teile Neutralisationsmittel
0,5 bis 5 Gew.-Teile Wachse
0,01 bis 0,15 Gew.-Teile Entschäumer
3 bis 20 Gew.-Teile Wasser
40 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Die erfindungsgemäßen Drucklacke lassen sich zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen verwenden, wobei der Drucklack beispielsweise über ein Farbwerk einer Bogen- oder Rollenoffset-Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird. Desgleichen kann der Drucklack auch aus Feuchtwerken, separaten Lackieraggregaten von Bogen- oder Rollenoffset-Druckmaschinen, Bogenlackiermaschinen, Tief- oder Flexodruckmaschinen in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen werden.

Die Erfindung wird nachfolgend anhand von Beispielen näher erläutert.

Beispiel 1

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Acrylat-Styrol-Copolymer (Mol-Gewicht 200.000) Säurezahl 90, wäßrige Dispersion	8
Acrylat-Styrol-Copolymer (Mol-Gewicht 1.000-40.000) Säurezahl 200 , Festharz	12
Netzmittel	2
Alkohole und Glykole	20
DEA/NH_3 -Neutralisationsmittel	3
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Wasser	10
Aluminiumpigmentpaste (65% Al) f.d. Einsatz im wäßrigen Bereich	40

Der Drucklack wird über das Farbwerk einer Bogenoffset-Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung auf Papier aufgetragen. Das Druckerzeugnis zeigt keinen Verlust an Glanz und Brillanz, die Abriebbeständigkeit ist hoch.

Beispiel 2

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Acrylat-Styrol-Copolymer (Mol-Gewicht 200.000), Säurezahl 90	-
Acrylat-Styrol-Copolymer (Mol-Gewicht 1.000 bis 40.000), Säurezahl 200	15
Netzmittel	3
Alkohole und Glykole	1
Amine und NH_3	5
Wachse	1
Entschäumer	0,05
Wasser	42
Aluminiumpigmentpaste (65% Al)	30
Farbstoff/Pigmente	3

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillanz, die Abriebfestigkeit war gut.

Beispiel 3

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Methylmethacrylatester, wäßrige Dispersion (Worléecryl 8415 von Worlée)	5,0
Vinylpropionat-Vinylpyrrolidon-Copolymer-Festharz (Collacral VL von BASF) Säurezahl	7
Netzmittel Polyurethan-Blockcopolymer (Disperbyk 182 von Byk)	15
Alkohole und Glykole	25
DEA/NH_3-Neutralisationsmittel	3
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Wasser	10
Aluminiumpigmentpaste (65% Al) f.d. Einsatz im wäßrigen Bereich	30

Der Drucklack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebsfestigkeit war gut.

Beispiel 4

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Methylmethacrylester, wäßrige Dispersion (Worleecryl 8415 von Worlee)	8
Vinylpropionat-Vinylpyrrolidon-Copolymer-Festharz (Collacral VL von BASF) Säurezahl	7
Netzmittel (Disperbyk 182)	15
Alkohole und Glykole	20
DEA/NH_3	1
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Goldbronzedruckschliff	45

Der Drucklack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebfestigkeit war gut.

Beispiel 5

Beim Austausch der Vinylpropionat-Vinylpyrrolidon durch Methylmethacrylatester werden gleiche Ergebnisse erhalten.

Beispiel 6

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Methylmethacrylatester, wäßrige Dispersion, (Worléecryl 8415 von Worlée)	4,5
Methylmethacrylatester, Festharz (Zinpol 146 von Worlée)	6,3
Netzmittel Polyurethan	13,5
Alkohole und Glykole	22,5
Amine und NH_3	2
Wachse	2
Entschäumer	0,01
Wasser	19
Aluminiumpigmentpaste (65 % Al)	27
Farbstoff/Pigmente	3,2

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz die Abriebsfestigkeit war gut.

Beispiel 7

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew.-Teile
Methylmethacrlyatester, wäßrige Dispersion, (Worléecryl 8415 von Worlée)	7,2
Methylmethacrylatester, Festharz (Zinpol 146 von Worlee)	6,3
Netzmittel	13
Alkohole und Glykole	18
Amine und NH_3	1
Wachse	2
Entschäumer	0,01
Wasser	7,5
Farbstoff/Pigmente	3
Goldbronzedruckschliff	42

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebsfestigkeit war gut.

Patentansprüche

1. Drucklack auf Wasserbasis, insbesondere für Gold- und Silberfarben, enthaltend:
   1 bis 60 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1 -C_4-Methacrylatester, als wäßrige Dispersion,
   1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1 -C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
   0 bis 60 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
   0,1 bis 30 Gew.-Teile Netzmittel
   0,1 bis 30 Gew.-Teile Neutralisationsmittel
   0,1 bis 30 Gew.-Teile natürliche und/oder synthetische Wachse
   0,001 bis 2 Gew.-Teile Entschäumer
   0 bis 80 Gew.-Teile Wasser
   1 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

2. Drucklack nach Anspruch 1, insbesondere zur Verwenung in Farbwerken, z.B. von Offset-Druckmaschinen und dergleichen, enthaltend:

1 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
5 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
5 bis 40 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,5 bis 20 Gew.-Teile Netzmittel
0,5 bis 15 Gew.-Teile Neutralisationsmittel
0,5 bis 15 Gew.-Teile Wachse
0,001 bis 1 Gew.-Teile Entschäumer
0 bis 40 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

3. Drucklack nach den Ansprüchen 1 oder 2, enthaltend:
5 bis 12 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
10 bis 15 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinypropioonat/Vinylpyrrolidon-Copolymere und/oder C_1 -C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
10 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 8 Gew.-Teile Netzmittel
1 bis 8 Gew.-Teile Neutralisationsmittel
1 bis 8 Gew.-Teile Wachse
0,005 bis 0,15 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

4. Drucklack nach den Ansprüchen 1 oder 3, enthaltend:
6 bis 10 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
11 bis 13 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
15 bis 25 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 3 Gew.-Teile Netzmittel
1 bis 5 Gew.-Teile Neutralisationsmittel
1 bis 3 Gew.-Teile Wachse
0,005 bis 0,02 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
25 bis 45 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

5. Drucklack nach Anspruch 1, insbesondere zur Verwendung in Lackieraggregaten und dergleichen, enthaltend:
1 bis 50 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew.-Teile Netzmittel
0,1 bis 20 Gew.-Teile Neutralisationsmittel
0,1 bis 15 Gew.-Teile Wachse
0,005 bis 1 Gew.-Teile Entschäumer
1 bis 70 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

6. Drucklack nach Anspruch 1 oder 5, enthaltend:
3 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
3 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0,01 bis 15 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester

1 bis 10 Gew.-Teile Netzmittel
1 bis 10 Gew.-Teile Neutralisationsmittel
0,1 bis 10 Gew.-Teile Wachse
0,01 bis 0,15 Gew.-Teile Entschäumer
3 bis 30 Gew.-Teile Wasser
20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

7. Drucklack nach den Ansprüchen 1 oder 6, enthaltend:
25 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
3 bis 25 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0,5 bis 5 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
2 bis 6 Gew.-Teile Netzmittel
5 bis 10 Gew.-Teile Neutralisationsmittel
0,5 bis 5 Gew.-Teile Wachse
0,01 bis 0,15 Gew.-Teile Entschäumer
3 bis 20 Gew.-Teile Wasser
40 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

8. Verfahren zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen unter Verwendung der Drucklacke nach den Ansprüchen 1 bis 4, dadurch gekennzeichnet, daß der Drucklack über ein Farbwerk einer Bogen- oder Rollen-Offset-Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird.

9. Verfahren zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen unter Verwendung der Drucklacke nach den Ansprüchen 1 und 5 bis 7, dadurch gekennzeichnet, daß der Drucklack aus Feuchtwerken, separaten Lackieraggregaten von Bogen- oder Rollen-Offset-Druckmaschinen, bogenlakkiermaschinen, Tief- oder Flexo-Druckmaschinen in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird.

Claims

1. A water-based printing ink, in particular for gold and silver inks, containing:
from 1 to 60 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester, as an aqueous dispersion,
from 1 to 40 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0 to 60 parts by weight of glycols or alcohols or glycol ether/etherester,
from 0.1 to 30 parts by weight of wetting agent,
from 0.1 to 30 parts by weight of neutralisation agent,
from 0.1 to 30 parts by weight of natural and/or synthetic waxes,
from 0.001 to 2 parts by weight of anti-foam agent,
from 0 to 80 parts by weight of water, and
from 1 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

2. A printing ink according to claim 1, in particular for use in inking mechanisms, for example of offset printing machines and the like, containing:
from 1 to 30 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester, as an aqueous dispersion,
from 5 to 40 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 5 to 40 parts by weight of glycols or alcohols or glycol ether/etherester,
from 0.5 to 20 parts by weight of wetting agent,
from 0.5 to 15 parts by weight of neutralisation agent,
from 0.5 to 15 parts by weight of waxes,
from 0.001 to 1 part by weight of anti-foam agent,
from 0 to 40 parts by weight of water, and

from 10 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

3 A printing ink according to claim 1 or claim 2, containing:
from 5 to 12 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 10 to 15 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 10 to 30 parts by weight of glycols or alcohols or glycol ether/etherester,
from 1 to 8 parts by weight of wetting agent,
from 1 to 8 parts by weight of neutralisation agent,
from 1 to 8 parts by weight of waxes,
from 0.005 to 0.15 parts by weight of anti-foam agent,
from 5 to 20 parts by weight of water, and
from 20 to 50 parts by weight of aluminium, mica and/or gold bronze pigments.

4 A printing ink according to claim 1 or 3 containing:
from 6 to 10 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 11 to 13 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 15 to 25 parts by weight of glycols or alcohols or glycol ether/etherester,
from 1 to 3 parts by weight of wetting agent,
from 1 to 5 parts by weight of neutralisation agent,
from 1 to 3 parts by weight of waxes,
from 0.005 to 0.02 parts by weight of anti-foam agent,
from 5 to 20 parts by weight of water, and
from 25 to 45 parts by weight of aluminium, mica and/or gold bronze pigments.

5. A printing ink according to claim 1, in particular for use in lacquering assemblies and the like, containing:
from 1 to 50 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 1 to 40 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0 to 30 parts by weight of glycols or alcohols or glycol ether/etherester,
from 0.1 to 30 parts by weight of wetting agent,
from 0.1 to 20 parts by weight of neutralisation agent,
from 0.1 to 15 parts by weight of waxes,
from 0.005 to 1 part by weight of anti-foam agent,
from 1 to 70 parts by weight of water, and
from 10 to 60 parts by weight of aluminium, mica and/or gold bronze pigments.

6. A printing ink according to claim 1 or claim 5, containing.
from 3 to 30 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,
from 3 to 30 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0.01 to 15 parts by weight of glycols or alcohols or glycol ether/etherester,
from 1 to 10 parts by weight of wetting agent,
from 1 to 10 parts by weight of neutralisation agent,
from 0.1 to 10 parts by weight of waxes,
from 0.01 to 0.15 parts by weight of anti-foam agent,
from 3 to 30 parts by weight of water, and
from 20 to 50 parts by weight of aluminium, mica and/or gold bronze pigments

7. A printing ink according to claim 1 or claim 6, containing:
from 25 to 30 parts by weight of styrene-methacrylic acid ester copolymer and/or C_1-C_4-methacrylate ester as an aqueous dispersion,

from 3 to 25 parts by weight of styrene-methacrylic acid ester copolymer and/or vinyl propionate/vinyl pyrrolidone copolymers and/or C_1-C_4-methacrylate ester as neutralisable water-soluble solid resins,
from 0.5 to 5 parts by weight of glycols or alcohols or glycol ether/etherester,
from 2 to 6 parts by weight of wetting agent,
from 5 to 10 parts by weight of neutralisation agent,
from 0.5 to 5 parts by weight of waxes,
from 0.01 to 0.15 parts by weight of anti-foam agent,
from 3 to 20 parts by weight of water, and
from 40 to 50 parts by weight of aluminium, mica and/or gold bronze pigments.

8. A method of printing on paper, cardboard, cardboard packaging and the like using the printing ink according to claims 1 to 4 characterised in that the printing ink is applied by way of an inking mechanism of a sheet-fed or roll-fed offset machine in a single working operation without subsequent lacquering.

9. A method of printing on paper, cardboard, cardboard packaging and the like using the printing ink according to claims 1 and 5 to 7 characterised in that the printing ink is applied from moistening mechanisms, separate lacquering assemblies of sheet-fed or roll-fed offset printing machines, sheet lacquering machines, intaglio or flexographic printing machines in a single working operation without subsequent lacquering.

Revendications

1. Encre d'imprimerie à base d'eau, en particulier pour des couleurs or et argent, contenant :
1 à 60 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous forme de dispersion aqueuse,
1 à 40 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous forme de résines solides neutralisables solubles dans l'eau,
0 à 60 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
0,1 à 30 parties en poids d'agent mouillant
0,1 à 30 parties en poids d'agent neutralisant
0,1 à 30 parties en poids de cires naturelles et/ou synthétiques
0,001 à 2 parties en poids d'antimousse
0 à 80 parties en poids d'eau
1 à 60 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

2. Encre d'imprimerie selon la revendication 1, en particulier pour l'utilisation dans des mécanismes d'encrage, par exemple de machine d'impression Offset, etc., contenant :
1 à 30 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous forme de dispersion aqueuse,
5 à 40 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous forme de résines solides neutralisables solubles dans l'eau,
5 à 40 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
0,5 à 20 parties en poids d'agent mouillant,
0,5 à 15 parties en poids d'agent neutralisant,
0,5 à 15 parties en poids de cires,
0,001 à 1 partie en poids d'antimousse,
0 à 40 parties en poids d'eau,
10 à 60 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

3. Encre d'imprimerie selon la revendication 1 ou 2, contenant :
5 à 12 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous foie de dispersion aqueuse,
10 à 15 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous foie de résines solides neutralisables solubles dans l'eau,

10 à 30 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
1 à 8 parties en poids d'agent mouillant,
1 à 8 parties en poids d'agent neutralisant,
1 à 8 parties en poids de cires,
0,005 à 0,15 partie en poids d'antimousse,
5 à 20 parties en poids d'eau,
20 à 50 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

4. Encre d'imprimerie selon la revendication 1 ou 3, contenant :
6 à 10 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous foie de dispersion aqueuse,
11 à 13 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous forme de résines solides neutralisables solubles dans l'eau,
15 à 25 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
1 à 3 parties en poids d'agent mouillant,
1 à 5 parties en poids d'agent neutralisant,
1 à 3 parties en poids de cires,
0,005 à 0,02 partie en poids d'antimousse,
5 à 20 parties en poids d'eau,
25 à 45 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

5. Encre d'imprimerie selon la revendication 1, en particulier pour l'utilisation dans des ensembles de laquage, etc. contenant :
1 à 50 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous forme de dispersion aqueuse,
1 à 40 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous foie de résines solides neutralisables solubles dans l'eau,
0 à 30 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
0,1 à 30 parties en poids d'agent mouillant,
0,1 à 20 parties en poids d'agent neutralisant,
0,1 à 15 parties en poids de cires,
0,005 à 1 partie en poids d'antimousse,
1 à 70 parties en poids d'eau,
10 à 60 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

6. Encre d'imprimerie selon la revendication 1 ou 5 contenant :
3 à 30 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous foie de dispersion aqueuse,
3 à 30 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous foie de résines solides neutralisables solubles dans l'eau,
0,01 à 15 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
1 à 10 parties en poids d'agent mouillant,
1 à 10 parties en poids d'agent neutralisant,
0,1 à 10 parties en poids de cires,
0,01 à 0,15 partie en poids d'antimousse,
3 à 30 parties en poids d'eau,
20 à 50 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

7. Encre d'imprimerie selon la revendication 1 ou 6, contenant :
25 à 30 parties en poids de copolymère styrène-esterméthacrylique et/ou de méthacrylate en C_1-C_4 sous foie de dispersion aqueuse,
3 à 25 parties en poids de copolymère styrène-esterméthacrylique et/ou de copolymères propionate de vinyle/vinyle-pyrrolidone et/ou de méthacrylate en C_1-C_4 sous forme de résines solides neutralisables solubles dans l'eau,

0,5 à 5 parties en poids de glycols ou d'alcools ou d'éthers/étheresters de glycol,
2 à 6 parties en poids d'agent mouillant,
5 à 10 parties en poids d'agent neutralisant,
0,5 à 5 parties en poids de cires,
0,01 à 0,15 partie en poids d'antimousse,
3 à 20 parties en poids d'eau,
40 à 50 parties en poids de pigments d'aluminium, de mica et/ou de bronze d'or.

8. Procédé d'impression du papier, du carton, des cartonnages, etc ..., en utilisant la laque d'impression selon les revendications 1 à 4, caractérisé en ce que la laque d'impression est appliquée au moyen du mécanisme d'encrage d'une machine Offset pour imprimer les feuilles ou les bobines en un seul passage sans laquage ultérieur.

9. Procédé d'impression du papier, du carton, des cartonnages, etc ..., en utilisant la laque d'impression selon les revendications 1 et 5 à 7, caractérisé en ce que la laque d'impression est appliquée en un seul passage, sans laquage ultérieur, au moyen de dispositifs de mouillage, d'ensembles de laquage séparés de machines Offset pour imprimer les feuilles ou les bobines, de machines d'impression hélio ou flexo.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Veröffentlichungsnummer: **0 543 385 A1**

(12) **EUROPÄISCHE PATENTANMELDUNG**

(21) Anmeldenummer: **92119749.7**

(51) Int. Cl.[5] **C09D 11/10, B41M 1/22**

(22) Anmeldetag: **19.11.92**

(30) Priorität: **19.11.91 DE 4138073**

(43) Veröffentlichungstag der Anmeldung: **26.05.93 Patentblatt 93/21**

(84) Benannte Vertragsstaaten: **AT BE CH DE DK ES FR GB GR IT LI LU MC NL PT SE**

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(54) **Drucklack auf Wasserbasis.**

(57) Ein Drucklack auf Wasserbasis, der insbesondere für Gold- und Silberfarben geeignet ist, hat folgende Zusammensetzung:

1 bis 60 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0 bis 60 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew.-Teile Netzmittel
0,1 bis 30 Gew.-Teile Neutralisationsmittel
0,1 bis 30 Gew.-Teile natürliche und/oder synthetische Wachse
0,001 bis 2 Gew.-Teile Entschäumer
0 bis 80 Gew.-Teile Wasser
1 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Der Lack eignet sich zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen, beispielsweise mit dem Farbwerk einer Bogen- oder Rollenoffset-Maschine, aus Feuchtwerken, separaten Lackieraggregaten von Bogen- oder Rollenoffset-Druckmaschinen, Bogenlackiermaschinen, Tief- oder Flexodruckmaschinen. Er kann in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen werden.

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Die vorliegende Erfindung betrifft einen neuartigen Drucklack auf Wasserbasis, der insbesondere für Gold- und Silberfarben geeignet ist.

Das Bedrucken von Papier oder Kartonagen mit Gold- bzw Silberfarben ist schwierig, insbesondere, wenn Offset-Druckverfahren verwendet werden sollen. Im allgemeinen wird so vorgegangen, daß in einem zusätzlichen Arbeitsgang eine Broncier-Unterdruckfarbe maschinell auf den Druckbogen aufgetragen wird. Auf diese Farbe wird anschließend auf eine Bronciermaschine im gleichen Arbeitsgang ein Bronzepulver eingestäubt. Durch die nachfolgende Farbtrocknung wird der sogenannte Bronzeschliff auf dem Druckbogen gebunden. Nach der Trocknung wird der Druckbogen mit Lösungsmittel-, Wasser- oder UV-Lack überlackiert, um die mehr oder minder losen Bronzeteilchen zu fixieren

Ein Nachteil dieser Vorgehensweise ist, daß zur Fixierung des Metallschliffes ein zusätzlicher Lackiervorgang erforderlich ist. Die verwendeten Metallschliffstäube können außerdem zu einer Gesundheitsgefährdung am Arbeitsplatz führen. Auch ist eine Verschmutzung der Maschinen und Druckprodukte in der Druckerei in Kauf zu nehmen. Trotzdem ist diese recht umständliche Vorgehensweise bisher verwendet worden, da das Druckergebnis von hoher optischer Qualität ist.

Bei der Verwendung von Goldfirnisfarben wird eine Ein- oder Zwei-Komponenten-Goldfarbe beispielsweise mittels einer Bogenoffset-Maschine Naß-in-Naß auf den Druckbogen aufgebracht. Da die Druckbögen im allgemeinen anschließend direkt weiterverarbeitet werden, ist auch hierbei eine nachträgliche Lackierung erforderlich, um eine gute Scheuerfestigkeit zu erzielen.

Bei dieser Naß-in-Naß-Auftragsweise ist ein durch die Lackierung hervorgerufener Verlust an Brillanz der Goldfarben nachteilig. Außerdem neigt der Metallschliff der Goldfarbe durch Feuchtigkeitsaufnahme zur Oxidation, was zu einem Glanzverlust sowie zu einer Farbtonveränderung im Sinne einer Schwärzung führt.

Auch bei Silberdruckfarben treten ähnliche Probleme wie bei den Goldfarben auf. Auch hier ist die Scheuerfestigkeit nur dann befriedigend, wenn eine nachträgliche Lackierung durchgeführt wird.

Aufgabe der vorliegenden Erfindung ist die Schaffung von Druckfarben auf Wasserbasis, mit denen Gold- und Silberfarben, Bronzen und dergleichen in einem einzigen Arbeitsgang aufgetragen werden können, ohne daß nachteilige Farbtonveränderungen, Verlust an Brillanz und Glanz auftreten, die eine hohe Scheuerfestigkeit aufweisen und in den unterschiedlichsten Druckverfahren Verwendung finden können.

Gelöst wird diese Aufgabe durch einen Drucklack gemäß dem Hauptanspruch, wobei die Unteransprüche bevorzugte Ausgestaltungen der Erfindung wiedergeben. Die Verfahrensansprüche betreffen Druckverfahren, in denen sich die erfindungsgemäßen Drucklacke einsetzen lassen.

Die erfindungsgemäßen Drucklacke sind auf der Grundlage von Styrol-Methacrylsäureester-Copolymeren, Vinylpropionat-Vinylpyrrolidon-Copolymeren und/oder Methacrylatestern konzipiert. Solche Copolymere sind bekannt, es ist aber überraschend, daß im Gegensatz zu anderen Polymeren für wäßrige Lacke bei Styrol-Methacrylester-Copolymeren beim Einsatz von Gold- oder Silberfarben die oben erwähnten Nachteile, insbesondere Verlust an Brillanz und Glanz sowie mangelnde Abriebfestigkeit, nicht auftreten. Somit eröffnen die erfindungsgemäßen Drucklacke erstmals die Möglichkeit, Gold- und Silberfarben in wäßrigen Lacken in einem einzigen Arbeitsgang mit den unterschiedlichsten Druckmaschinen zu verarbeiten.

Die erfindungsgemäßen Styrol-Methacrylsäureester-Copolymeren enthalten etwa 60 bis 95 Gew.-% Styrol und etwa 5 bis 40 Gew.-% Methacrylsäureester, bezogen auf die Gesamtmenge der Polymeren. Bevorzugt ist eine Zusammensetzung, die etwa 70 bis 90 Gew.-% Styrol und etwa 10 bis 30 Gew.-% Methacrylsäureester enthält. Als Methacrylsäureester werden die Ester von Methacrylsäure mit Alkoholen mit 1 bis 4 Kohlenstoffatomen bevorzugt, insbesondere werden die Methylester verwendet. Die in den erfindungsgemäßen Drucklacken verwendeten Copolymeren werden sowohl in Form wäßriger Dispersion als auch in Form von Festharz eingesetzt. In den wäßrigen Dispersionen haben die Copolymeren wohl Gewichte von mehr als 100.000, bevorzugt von mehr als 200.000, ihre Säurezahl liegt unter 150, bevorzugt unter 100, und insbesondere zwischen 70 und 100. Der Wassergehalt solcher wäßrigen Copolymerdispersionen liegt zwischen 60 und 50 Gew.-%.

Die als Festharz eingesetzten Copolymeren weisen Mol-Gewichte unter 100.000 auf, bevorzugt unter 50.000. Ihre Säurezahl liegt über 150, bevorzugt im Bereich von 150 bis 300 und besonders bevorzugt im Bereich von 150 bis 250. Der Wassergehalt dieser Festharze ist so gering, daß er vernachlässigt werden kann.

Die erfindungsgemäßen Drucklacke können 1 bis 60 Gew.-% einer wäßrigen Dispersion von Styrol-Methacrylsäureester-Copolymer enthalten.

Beim Einsatz in Farbwerken von Offset-Druckmaschinen und dergleichen und ähnlichen Vorrichtungen, bei denen eine hohe Viskosität erwünscht ist, beträgt der Gehalt an wäßriger Dispersion im allgemeinen 1 bis 30 Gew.-%, bevorzugt 5 bis 12 Gew.-% und insbesondere 6 bis 10 Gew.-%.

An Styrol-Methacrylsäureester-Copolymer in Form von Festharz werden 1 bis 40 Gew.-% eingesetzt beim Einsatz in Farbwerken, z.B. von Offset-Druckmaschinen und dergleichen oder ähnlichen Vorrichtungen, beträgt der Gehalt an Festharz insbesondere 5 bis 40 Gew.-%, bevorzugt 10 bis 15 Gew.-% und besonders bevorzugt 10 bis 12 Gew.-%.

Das als Festharz eingesetzte Styrol-Methacrylsäureester-Copolymer kann ganz oder teilweise durch Vinylpropionat-Vinylpyrrolidon-Copolymer oder Methacrylatester von Alkoholen mit 1 bis 4 Kohlenstoffatomen ersetzt werden, wobei die eingesetzte Gesamtmenge unverändert bleibt.

Beim Einsatz der erfindungsgemäßen Lacke in Lackieraggregaten, Lackiermaschinen, separaten Lackierwerken bzw. Leim oder Lackierwerken von Rollenoffset-Maschinen sollten die Lacke im allgemeinen eine niedrigere Viskosität aufweisen. Demgemäß sind auch die Gehalte bei diesem Anwendungszweck unterschiedlich von dem weiter oben genannten. Der Gehalt an wäßriger Dispersion beträgt bei diesem Anwendungszweck im allgemeinen 1 bis 50 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 25 bis 30 Gew.-%. Der Gehalt an Festharz beträgt im allgemeinen 1 bis 40 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 3 bis 25 Gew.-%, insbesondere 3 bis 10 Gew.-%.

Die erfindungsgemäßen Drucklacke können weiterhin Glykole, Alkohole oder Glykolether/etherester als Feuchthaltemittel enthalten. Als Glykole werden beispielsweise Ethylenglykole, Propylenglykole, oder Butylenglykole eingesetzt. Bevorzugt wird 1,2-Propylenglykol verwendet. Bei der Verwendung der Drucklacke beispielsweise in Farbwerken ist die Anwesenheit von Feuchthaltemitteln zwingend erforderlich. Der Gehalt an Feuchthaltemitteln kann beim Einsatz in Farbwerken und dergleichen bis 60 Gew.-% betragen, im allgemeinen beträgt er 5 bis 40 Gew.-%, bevorzugt 10 bis 30 Gew.-% und insbesondere 15 bis 25 Gew.-%. Beim Einsatz der Drucklacke in Lackieraggregaten und dergleichen kann der Gehalt ebenfalls bis zu 60 Gew.-% betragen, bevorzugt 0 bis 30 Gew.-%, besonders bevorzugt 0,01 bis 15 Gew.-% und insbesondere bevorzugt 0,5 bis 5 Gew.-%.

Zur Verbesserung der Oberflächenaktivität enthalten die Drucklacke weiterhin Netzmittel. Als Netzmittel werden vorzugsweise Sulfosuccinate oder Polyurethan-Blockcopolymere verwendet. Der Gehalt an Netzmitteln beträgt 0,1 bis 30 Gew.-%. Beim Einsatz in Farbwerken und dergleichen beträgt der Gehalt vorzugsweise 0,5 bis 15 Gew.-%, besonders bevorzugt 1 bis 8 Gew.-% und insbesondere 1 bis 3 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt bevorzugt 0,1 bis 30 Gew.-%, besonders bevorzugt 1 bis 10 Gew.-% und insbesondere 2 bis 6 Gew.-%.

Zur Neutralisation der im Copolymer enthaltenen Säuren enthalten die erfindungsgemäßen Drucklacke Neutralisationsmittel, wobei hierfür die üblicherweise in solchen Polymeren verwendeten alkalischen Stoffe, wie Amine, Ammoniak usw. verwendet werden. Der Gehalt an Neutralisationsmitteln beträgt in Abhängigkeit vom Säuregehalt im allgemeinen 0,1 bis 30 Gew.-%. Beim Einsatz in Farblacken und dergleichen kann der Gehalt an Neutralisationsmitteln 0,5 bis 15 Gew.-% betragen, bevorzugt 1 bis 8 Gew.-% und besonders bevorzugt 1 bis 5 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt im allgemeinen 0,1 bis 20 Gew.-%, bevorzugt 1 bis 10 Gew.-% und besonders bevorzugt 5 bis 10 Gew.-%. Wie die obigen Werte zeigen, müssen bei Drucklacken, die für die Verwendung in Lackieraggregaten gedacht sind, wegen der höheren Säurezahl der eingesetzten Acrylate, d.h. wegen der höheren Anteile der entsprechenden Acrylate, auch die als Neutralisationsmittel eingesetzten Mengen größer sein.

Zur Erhöhung der Abriebfestigkeit enthalten die erfindungsgemäßen Drucklacke natürliche und/oder synthetische Wachse. Solche Wachse sind beispielsweise Polyethylenwachse, Carnaubawachse usw.. Ihr Gehalt beträgt im allgemeinen 0,1 bis 30 Gew.-%. Beim Einsatz in Farbwerken und dergleichen kann der Gehalt 0,5 bis 15 Gew.-% betragen, bevorzugt 1 bis 8 Gew.-% und besonders bevorzugt 1 bis 5 Gew.-%. Beim Einsatz in Lackieraggregaten kann der Gehalt 0,1 bis 15 Gew.-% betragen, bevorzugt 0,1 bis 10 Gew.-% und besonders bevorzugt 0,5 bis 5 Gew.-%.

Zur Vermeidung einer übermäßigen Schaumbildung enthalten die erfindungsgemäßen Drucklacke Entschäumer, beispielsweise die für diesen Zweck üblichen Silikonentschäumer. Ihr Gehalt beträgt im allgemeinen 0,001 bis 2 Gew.-%. Beim Einsatz in Lackierwerken und dergleichen beträgt der Gehalt im allgemeinen 0,001 bis 1 Gew.-%, bevorzugt 0,005 bis 0,15 Gew.-% und besonders bevorzugt 0,005 bis 0,02 Gew.-%. Beim Einsatz in Lackieraggregaten und dergleichen beträgt der Gehalt im allgemeinen 0,005 bis 1 Gew.-%, bevorzugt 0,01 bis 0,15 Gew.-%.

Der Wassergehalt der erfindungsgemäßen Drucklacke kann in weiten Grenzen schwanken. Er liegt zwischen 0 bis 80 Gew.-%. Drucklacke für den Einsatz in Farbwerken und dergleichen enthalten im allgemeinen 0 bis 40 Gew.-%, bevorzugt 5 bis 20 Gew.-%. Für den Einsatz in Lackieraggregaten enthalten sie im allgemeinen 1 bis 70 Gew.-%, bevorzugt 3 bis 30 Gew.-% und besonders bevorzugt 3 bis 20 Gew.-%. Die erfindungsgemäßen Drucklacke sind insbesondere für das Drucken mit Gold- und Silberfarben gedacht. Solche Lacke enthalten als Farbstoffe bzw. Pigmente die hierfür üblichen Metallschliffstäube, Bronzeschliffpulver, Kupferlegierungen, Goldfirnispigmente, Silberdruckfarben, Aluminiumpig-

mentpasten, eventuell mit organischen Farbstofflösungen, Glimmerpigmente (Iriodine) und dergleichen.

Die erfindungsgemäßen Drucklacke eignen sich beispielsweise für den Einsatz in Farbwerken von Bogen- oder Rollenoffset-Maschinen. Dabei läßt sich beispielsweise Papier oder Karton in einem einzigen Arbeitsgang mit beispielsweise einer Goldfarbe bedrucken und lackieren, ohne daß die Goldfarbe an Brillanz oder Glanz verliert. Dabei weist die bedruckte Oberfläche eine höhere Scheuerfestigkeit auf.

Andererseits läßt sich der erfindungsgemäße Drucklack auch in separaten Lackieraggregaten von Offset-Druckmaschinen und dergleichen, wie umgebaute Feuchtwerke, Hebefeuchtwerke, Alkoholfeuchtwerke, auf Leim- oder Lackwerken in Rollenoffset-Maschinen, Lackiermaschinen, wie z.B Billhöfer sowie in Tief- oder Flexodruck-Maschinen einsetzen.

Entsprechend den obigen Angaben weisen die erfindungsgemäßen Drucklacke folgende Zusammensetzung auf, wobei die Zusammensetzung im folgenden in Gewichts-Teilen (Gew.-Teilen) angegeben wird, da sich die angegebenen Mengen nicht in allen Fällen zu 100% ergänzen. Die Angabe der Gew.-Teile bezieht sich auf den Gew.-Anteil des Bestandteils an der Summe des Gesamtgewichts. Es versteht sich, daß innerhalb einer Rezeptur alle Gew.-Angaben sich auf gleiche Gew.-Einheiten beziehen.

Die erfindungsgemäßen Drucklacke haben die folgende Zusammensetzung:

1 bis 60 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion
1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0 bis 60 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew.-Teile Netzmittel
0,1 bis 30 Gew.-Teile Neutralisationsmittel
0,1 bis 30 Gew.-Teile natürliche und/oder synthetische Wachse
0,001 bis 2 Gew.-Teile Entschäumer
0 bis 80 Gew.-Teile Wasser
1 bis 80 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente

Für den Einsatz in Farbwerken, beispielsweise von Offset-Druckmaschinen und dergleichen haben die Drucklacke die folgende Zusammensetzung:

1 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
5 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymer oder C_{1-4}-Methacrylatester als neutralisierbare wasserlösliche Festharze,
5 bis 40 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,5 bis 20 Gew.-Teile Netzmittel
0,5 bis 15 Gew.-Teile Neutralisationsmittel,
0,5 bis 15 Gew.-Teile Wachse
0,001 bis 1 Gew.-Teil Entschäumer
0 bis 40 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Für den gleichen Einsatz ist folgende Zusammensetzung bevorzugt:

5 bis 12 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methyacrylatester, als wäßrige Dispersion
10 bis 15 Gew.-Teile Stryrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vinylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutraliserbare wasserlösliche Festharze
10 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 8 Gew.-Teile Netzmittel
1 bis 8 Gew.-Teile Neutralisationsmittel
1 bis 8 Gew.-Teile Wachse
0,005 bis 0,15 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

Insbesondere ist folgende Zusammensetzung bevorzugt.

6 bis 10 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder C_1-C_4-Methacrylatester, als wäßrige Dispersion
10 bis 13 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, oder Vinylpropionat/Vnylpyrrolidon-Copolymere oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze
15 bis 25 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 3 Gew.-Teile Netzmittel

1 bis 5 Gew - Teile Neutralisationsmittel
1 bis 5 Gew. - Teile Wachse
0 005 bis 0,02 Gew. - Teile Entschäumer
5 bis 20 Gew. - Teile Wasser
25 bis 45 Gew. - Teile Aluminium - , Glimmer - und/oder Goldbronze - Pigmente.

Für den Einsatz in Lackieraggregaten und dergleichen wird im allgemeinen folgende Zusammensetzung verwendet:

1 bis 50 Gew. - Teile Stryrol - Methacrylsäureester - Copolymer, oder $C_1 - C_4$ - Methacrylatester, als wäßrige Dispersion
1 bis 40 Gew. - Teile Styrol - Methacrylsäureester - Copolymer, oder Vinylpropionat/Vinylpyrrolidon - Copolymer oder $C_1 - C_4$ - Methacrylatester als neutralisierbare wasserlösliche Festharze
0 bis 30 Gew. - Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew. - Teile Netzmittel
0,1 bis 20 Gew. - Teile Neutralisationsmittel
0,1 bis 15 Gew. - Teile Wachse
0,005 bis 1 Gew. - Teile Entschäumer
1 bis 70 Gew. - Teile Wasser
10 bis 60 Gew. - Teile Aluminium - , Glimmer - und/oder Goldbronze - Pigmente.

Bevorzugt ist für diesen Einsatz die folgende Zusammensetzung:

3 bis 30 Gew. - Teile Styrol - Methacrylsäureester - Copolymer, oder $C_1 - C_4$ - Methacrylatester, als wäßrige Dispersion
3 bis 30 Gew. - Teile Styrol - Methacrylsäureester - Copolymer, oder Vinylpropionat/Vinylpyrrolidon - Copolymer oder $C_1 - C_4$ - Methacrylatester als neutralisierbare wasserlösliche Festharze
0,01 bis 15 Gew. - Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 20 Gew. - Teile Netzmittel
1 bis 10 Gew. - Teile Neutralisationsmittel
0,1 bis 10 Gew. - Teile Wachse
0,01 bis 0,15 Gew. - Teile Entschäumer
3 bis 30 Gew. - Teile Wasser
20 bis 50 Gew. - Teile Aluminium - , Glimmer - und/oder Goldbronze - Pigmente.

Besonders bevorzugt ist für diesen Einsatz die folgende Zusammensetzung:

25 bis 30 Gew. - Teile Styrol - Methacrylsäureester - Copolymer, oder $C_1 - C_4$ - Methacrylatester, als wäßrige Dispersion
20 bis 25 Gew. - Teile Styrol - Methacrylsäureester - Copolymer, oder Vinylpropionat/Vinylpyrrolidon - Copolymere oder $C_1 - C_4$ - Methacrylatester als neutralisierbare wasserlösliche Festharze
0,5 bis 5 Gew. - Teile Glykole oder Alkohole oder Glykolether/etherester
2 bis 6 Gew. - Teile Netzmittel
5 bis 10 Gew. - Teile Neutralisationsmittel
0,5 bis 5 Gew. - Teile Wachse
0,01 bis 0,15 Gew. - Teile Entschäumer
3 bis 20 Gew. - Teile Wasser
40 bis 50 Gew. - Teile Aluminium - , Glimmer - und/oder Goldbronze - Pigmente.

Die erfindungsgemäßen Drucklacke lassen sich zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen verwenden, wobei der Drucklack beispielsweise über ein Farbwerk einer Bogen - oder Rollenoffset - Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird. Desgleichen kann der Drucklack auch aus Feuchtwerken, separaten Lackieraggregaten von Bogen - oder Rollenoffset - Druckmaschinen, Bogenlackiermaschinen, Tief - oder Flexodruckmaschinen in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen werden.

Die Erfindung wird nachfolgend anhand von Beispielen näher erläutert.

Beispiel 1

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Acrylat - Styrol - Copolymer (Mol - Gewicht 200.000) Säurezahl 90, wäßrige Dispersion	8
Acrylat - Styrol - Copolymer (Mol - Gewicht 1.000 - 40.000) Säurezahl 200 , Festharz	12
Netzmittel	2
Alkohole und Glykole	20
DEA/NH_3 - Neutralisationsmittel	3
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Wasser	10
Aluminiumpigmentpaste (65% Al) f.d. Einsatz im wäßrigen Bereich	40

Der Drucklack wird über das Farbwerk einer Bogenoffset-Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung auf Papier aufgetragen. Das Druckerzeugnis zeigt keinen Verlust an Glanz und Brillanz, die Abriebbeständigkeit ist hoch.

Beispiel 2

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Acrylat - Styrol - Copolymer (Mol - Gewicht 200.000), Säurezahl 90	-
Acrylat - Styrol - Copolymer (Mol - Gewicht 1.000 bis 40.000), Säurezahl 200	15
Netzmittel	3
Alkohole und Glykole	1
Amine und NH_3	5
Wachse	1
Entschäumer	0,05
Wasser	42
Aluminiumpigmentpaste (65% Al)	30
Farbstoff/Pigmente	3

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillanz, die Abriebfestigkeit war gut.

Beispiel 3

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Methylmethacrylatester, wäßrige Dispersion (Worléecryl 8415 von Worlée)	5,0
Vinylpropionat - Vinylpyrrolidon - Copolymer - Festharz (Collacral VL von BASF)	
Säurezahl	7
Netzmittel Polyurethan - Blockcopolymer (Disperbyk 182 von Byk)	15
Alkohole und Glykole	25
DEA/NH_3 - Neutralisationsmittel	3
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Wasser	10
Aluminiumpigmentpaste (65% Al) f.d. Einsatz im wäßrigen Bereich	30

Der Drucklack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebsfestigkeit war gut.

Beispiel 4

Durch Vermischen der Bestandteile wird ein Drucklack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Methylmethacrylester, wäßrige Dispersion (Worleecryl 8415 von Worlee)	8
Vinylpropionat - Vinylpyrrolidon - Copolymer - Festharz (Collacral VL von BASF)	
Säurezahl	7
Netzmittel (Disperbyk 182)	15
Alkohole und Glykole	20
DEA/NH_3	1
Wachse	2
Entschäumer	0,01
Pigmente/Farbstoffe	3
Goldbronzedruckschliff	45

Der Drucklack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebfestigkeit war gut.

Beispiel 5

Beim Austausch der Vinylpropionat - Vinylpyrrolidon durch Methylmethacrylatester werden gleiche Ergebnisse erhalten.

Beispiel 6

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Methylmethacrylatester, wäßrige Dispersion, (Worléecryl 8415 von Worlée)	4,5
Methylmethacrylatester, Festharz (Zinpol 146 von Worlée)	6,3
Netzmittel Polyurethan	13,5
Alkohole und Glykole	22,5
Amine und NH_3	2
Wachse	2
Entschäumer	0,01
Wasser	19
Aluminiumpigmentpaste (65 % Al)	27
Farbstoff/Pigmente	3,2

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz die Abriebsfestigkeit war gut.

Beispiel 7

Durch Vermischen der Bestandteile wird ein Wasserlack folgender Zusammensetzung hergestellt:

	Gew. - Teile
Methylmethacrlyatester, wäßrige Dispersion, (Worléecryl 8415 von Worlée)	7,2
Methylmethacrylatester, Festharz (Zinpol 146 von Worlee)	6,3
Netzmittel	13
Alkohole und Glykole	18
Amine und NH_3	1
Wachse	2
Entschäumer	0,01
Wasser	7,5
Farbstoff/Pigmente	3
Goldbronzedruckschliff	42

Der Lack wurde mit einer Bogenlackiermaschine auf Papier aufgetragen. Er zeigte keinen Verlust an Glanz und Brillianz, die Abriebsfestigkeit war gut.

Patentansprüche

1. Drucklack auf Wasserbasis, insbesondere für Gold- und Silberfarben, enthaltend:
   1 bis 60 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder C_1-C_4-Methacrylatester, als wäßrige Dispersion,
   1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder C_1-C_4-Methacrylatester als neutralisierbare wasserlösliche Festharze,
   0 bis 60 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
   0,1 bis 30 Gew.-Teile Netzmittel
   0,1 bis 30 Gew.-Teile Neutralisationsmittel
   0,1 bis 30 Gew.-Teile natürliche und/oder synthetische Wachse
   0,001 bis 2 Gew.-Teile Entschäumer
   0 bis 80 Gew.-Teile Wasser
   1 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

2. Drucklack nach Anspruch 1, insbesondere zur Verwendung in Farbwerken, z.B. von Offset-Druckmaschinen und dergleichen, enthaltend:
1 bis 30 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder $C_1 - C_4$-Methacrylatester, als wäßrige Dispersion,
5 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder $C_1 - C_4$-Methacrylatester als neutralisierbare wasserlösliche Festharze,
5 bis 40 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,5 bis 20 Gew.-Teile Netzmittel
0,5 bis 15 Gew.-Teile Neutralisationsmittel
0,5 bis 15 Gew.-Teile Wachse
0,001 bis 1 Gew.-Teile Entschäumer
0 bis 40 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

3. Drucklack nach den Ansprüchen 1 oder 2, enthaltend:
5 bis 12 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder $C_1 - C_4$-Methacrylatester, als wäßrige Dispersion,
10 bis 15 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinypropioonat/Vinylpyrrolidon-Copolymere und/oder $C_1 - C_4$-Methacrylatester als neutralisierbare wasserlösliche Festharze,
10 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 8 Gew.-Teile Netzmittel
1 bis 8 Gew.-Teile Neutralisationsmittel
1 bis 8 Gew.-Teile Wachse
0,005 bis 0,15 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
20 bis 50 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

4. Drucklack nach den Ansprüchen 1 oder 3, enthaltend:
6 bis 10 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder $C_1 - C_4$-Methacrylatester, als wäßrige Dispersion,
11 bis 13 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder $C_1 - C_4$-Methacrylatester als neutralisierbare wasserlösliche Festharze,
15 bis 25 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 3 Gew.-Teile Netzmittel
1 bis 5 Gew.-Teile Neutralisationsmittel
1 bis 3 Gew.-Teile Wachse
0,005 bis 0,02 Gew.-Teile Entschäumer
5 bis 20 Gew.-Teile Wasser
25 bis 45 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

5. Drucklack nach Anspruch 1, insbesondere zur Verwendung in Lackieraggregaten und dergleichen, enthaltend:
1 bis 50 Gew.-Teile Styrol-Methacrylsäureester-Copolymer, und/oder $C_1 - C_4$-Methacrylatester, als wäßrige Dispersion,
1 bis 40 Gew.-Teile Styrol-Methacrylsäureester-Copolymer und/oder Vinylpropionat/Vinylpyrrolidon-Copolymere und/oder $C_1 - C_4$-Methacrylatester als neutralisierbare wasserlösliche Festharze,
0 bis 30 Gew.-Teile Glykole oder Alkohole oder Glykolether/etherester
0,1 bis 30 Gew.-Teile Netzmittel
0,1 bis 20 Gew.-Teile Neutralisationsmittel
0,1 bis 15 Gew.-Teile Wachse
0,005 bis 1 Gew.-Teile Entschäumer
1 bis 70 Gew.-Teile Wasser
10 bis 60 Gew.-Teile Aluminium-, Glimmer- und/oder Goldbronze-Pigmente.

6. Drucklack nach Anspruch 1 oder 5, enthaltend:
3 bis 30 Gew. – Teile Styrol – Methacrylsäureester – Copolymer, und/oder $C_1 - C_4$ – Methacrylatester, als wäßrige Dispersion,
3 bis 30 Gew. – Teile Styrol – Methacrylsäureester – Copolymer und/oder Vinylpropionat/Vinylpyrrolidon – Copolymere und/oder $C_1 - C_4$ – Methacrylatester als neutralisierbare wasserlösliche Festharze,
0,01 bis 15 Gew. – Teile Glykole oder Alkohole oder Glykolether/etherester
1 bis 10 Gew. – Teile Netzmittel
1 bis 10 Gew. – Teile Neutralisationsmittel
0,1 bis 10 Gew. – Teile Wachse
0,01 bis 0,15 Gew. – Teile Entschäumer
3 bis 30 Gew. – Teile Wasser
20 bis 50 Gew. – Teile Aluminium – , Glimmer – und/oder Goldbronze – Pigmente.

7. Drucklack nach den Ansprüchen 1 oder 6, enthaltend:
25 bis 30 Gew. – Teile Styrol – Methacrylsäureester – Copolymer, und/oder $C_1 - C_4$ – Methacrylatester, als wäßrige Dispersion,
3 bis 25 Gew. – Teile Styrol – Methacrylsäureester – Copolymer und/oder Vinylpropionat/Vinylpyrrolidon – Copolymere und/oder $C_1 - C_4$ – Methacrylatester als neutralisierbare wasserlösliche Festharze,
0,5 bis 5 Gew. – Teile Glykole oder Alkohole oder Glykolether/etherester
2 bis 6 Gew. – Teile Netzmittel
5 bis 10 Gew. – Teile Neutralisationsmittel
0,5 bis 5 Gew. – Teile Wachse
0,01 bis 0,15 Gew. – Teile Entschäumer
3 bis 20 Gew. – Teile Wasser
40 bis 50 Gew. – Teile Aluminium – , Glimmer – und/oder Goldbronze – Pigmente.

8. Verfahren zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen unter Verwendung der Drucklacke nach den Ansprüchen 1 bis 4, dadurch gekennzeichnet, daß der Drucklack über ein Farbwerk einer Bogen – oder Rollen – Offset – Maschine in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird.

9. Verfahren zum Bedrucken von Papier, Pappe, Kartonagen und dergleichen unter Verwendung der Drucklacke nach den Ansprüchen 1 und 5 bis 7, dadurch gekennzeichnet, daß der Drucklack aus Feuchtwerken, separaten Lackieraggregaten von Bogen – oder Rollen – Offset – Druckmaschinen, bogenlackiermaschinen, Tief – oder Flexo – Druckmaschinen in einem einzigen Arbeitsgang ohne nachfolgende Lackierung aufgetragen wird.

Europäisches Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung

EP 92 11 9749

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl.5)
A	US-A-3 560 417 (PIZZI) * Anspruch 1 * -----	1	C09D11/10 B41M1/22
			RECHERCHIERTE SACHGEBIETE (Int. Cl.5)
			C09D B41M

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt

Recherchenort	Abschlußdatum der Recherche	Prüfer
DEN HAAG	24 FEBRUAR 1993	Dieter Schüler

KATEGORIE DER GENANNTEN DOKUMENTE

X : von besonderer Bedeutung allein betrachtet
Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie
A : technologischer Hintergrund
O : nichtschriftliche Offenbarung
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T : der Erfindung zugrunde liegende Theorien oder Grundsätze
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D : in der Anmeldung angeführtes Dokument
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& : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 574 124 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93303265.8**

(22) Date of filing: **27.04.93**

(51) Int. Cl.^{5}: **B41F 23/08**, B05C 1/08

(30) Priority: **06.05.92 US 879841**

(43) Date of publication of application: **15.12.93 Bulletin 93/50**

(84) Designated Contracting States: **AT CH DE DK FR GB IT LI SE**

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(54) Coating apparatus for sheet-fed, rotary offset printing presses.

(57) A coating apparatus (10) for use in a sheet-fed or web-fed, offset rotary or flexographic printing press (12) to apply a protective and/or decorative coating to the surface of freshly printed sheets (18) includes a doctor blade coating unit (60) coupled to a pickup roller (68) for supplying liquid material from a remote supply drum (102) to sheets transported on the surface of a transfer/delivery cylinder (42) mounted on a press delivery drive shaft (54). Liquid material is circulated through the reservoir (66) of the doctor blade unit by suction flow produced by a return pump (112). This prevents the buildup of positive pressure within the doctor blade reservoir (66). The doctor blade reservoir is maintained at below ambient pressure level, thereby inhibiting leakage through the end seals. A vacuum sensor assembly (122, 128) provides a visual indication of air vacuum pressure in the doctor blade reservoir chamber, and a vacuum sensor switch (132) applies electrical power to an audio transducer (136). The audio transducer produces an audible alarm in response to an increase in doctor blade chamber pressure, thereby providing advance warning of an impending end seal failure or a worn doctor blade (94, 96) condition.

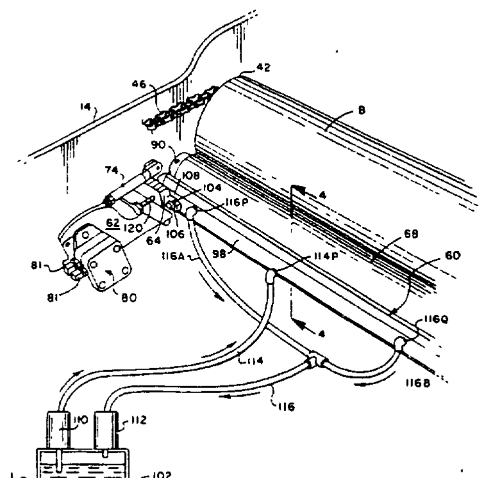

FIG 3

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This invention is related generally to sheet-fed or web-fed, rotary offset or flexographic printing presses, and more particularly to a new and improved coating apparatus for the in-line application of protective and decorative coatings or inks to the printed surface of freshly printed sheets or web stock.

In some printing applications, it is desirable that the press be capable of applying a protective and/or decorative coating over all or a portion of the surface of the printed sheets. Typical coating solutions include varnish, lacquer, dye, moisturizers and ink. Typically, such coatings are formed of a UV-curable or water-soluble resin applied as a liquid solution or emulsion by an applicator roller over the freshly printed sheets to protect the ink and improve the appearance of the sheets. The use of such coatings is particularly desirable when decorative or protective finishes are required such as in the production of posters, record jackets, brochures, magazines, folding cartons and the like. In applications where a liquid coating is to be applied, the coating operation is carried out after the final ink printing has been performed, most desirably by an in-line coater.

Conventional coating apparatus which is operable as an in-line press operation utilizes an engraved applicator roller, with the liquid coating being applied to the engraved roller by means of a doctor blade assembly. The doctor blade assembly includes an elongated housing having a reservoir chamber extending the length of the applicator roller for holding a volume of coating liquid in wetting contact with the circumferential surface of the applicator roller. A pair of circumferentially spaced doctor blades extend longitudinally along the reservoir housing on either side of the chamber. The doctor blades are angled obliquely toward the applicator roller surface, and seal the doctor reservoir chamber as the blades wipe against the applicator roller surface.

Coating liquid is pumped from a remote supply drum into the doctor reservoir. After the doctor reservoir fills to a certain level, the liquid coating material is returned to the supply drum by gravity flow. Occasionally, the doctor reservoir becomes completely filled with the coating liquid when the volume of coating liquid being pumped into the doctor reservoir exceeds the gravity flow return rate, and the doctor reservoir becomes positively pressurized. The positive pressure may cause the seals at the ends of the applicator roller to leak, allowing the coating liquid to drip onto the press room floor or onto adjacent press parts. The coating liquid may be slung from the applicator roller onto adjacent press equipment and operator areas. Moreover, the buildup of positive pressure within the doctor reservoir accelerates the wear of the end seals.

It will be appreciated that the applicator roller may be operated at high speeds, for example, on the order of 1,000 linear feet per minute (304.8 meters per minute), and that the end seals of the doctor blade assembly will tend to wear quickly. The end seal wear is accelerated by the buildup of positive pressure within the doctor blade chamber. Low volume drip leakage may be collected in a drip pan or catch tray, but as the end seals wear, the coating liquid will be slung from the applicator roller, thereby causing a difficult cleanup problem. When this occurs, the press must be shut down, the doctor blade head must be removed, and the end seals replaced. The steps of rebuilding or replacing the end seals and realigning the doctor blade head involves a substantial amount of unproductive press downtime.

One approach for overcoming the problem of end seal wear is to provide stationary end seals which are mounted on the press frame, and which bear in sealing engagement against the ends of the applicator roller, so that the doctor blade head may form a seal with stationary seals rather than with dynamic seals carried on the applicator roller. Another approach is to use rotary end seals which include an end plate which is resiliently engaged against the end surface of the applicator roller, with a seal member being secured between the end plate and the end portions of the applicator roller by quick release mounting lugs.

While the foregoing mechanical approaches to limiting end seal wear and thereby avoiding leakage have been moderately successful, and some arrangements have reduced downtime by quick change mounting features, the end seals nevertheless are still experiencing accelerated wear and early failure, thereby causing frequent replacements and unacceptable downtime for correction of end seal leakage.

Accordingly, there exists a need for a new and improved in-line coating apparatus for use in a sheet-fed or web-fed, offset rotary or flexographic printing press for applying a protective and/or decorative coating to the printed surface of freshly printed sheets which does not require any expensive or substantial press modification or result in any impairment of normal press operating capability, and which reduces end seal leakage.

The present invention reduces end seal leakage by operating the doctor reservoir at a below atmospheric pressure level. The doctor reservoir is supplied with coating material from a remote supply drum. To insure that an adequate supply of coating liquid is always present within the doctor reservoir, the liquid coating material is drawn from the remote supply drum and is circulated by suction flow through the reservoir. In contrast to the conventional approach of positively pressurizing the doctor blade reservoir with liquid coating pumped from the remote drum to the reservoir, the coating material is instead circulated through the doctor reservoir by suction flow. That is, instead of charging the doctor reservoir with coating liquid pumped from the remote drum and thereby creating a positive pressure condition within the doctor

reservoir, circulation of coating liquid through the reservoir is induced by suction flow provided by a suction pump having an input connected for drawing coating liquid from the doctor reservoir, and returning it by forced (positive pressure) flow to the remote supply drum, rather than by gravity flow return.

As a result of the suction pumping arrangement, the liquid coating material is drawn from the remote supply drum at a greater rate than the rate of transfer of the liquid material by the applicator roller, so that an adequate supply of liquid material will always be present within the doctor reservoir. A benefit of the suction flow arrangement is that a positive pressure condition does not occur within the doctor reservoir. Moreover, liquid material which rises above a predetermined fill level is drawn out of the doctor reservoir by the suction return pump, and is returned to the remote supply drum. Consequently, the end seals are not subjected to high positive pressure conditions. Instead, the suction flow arrangement produces a negative pressure differential, with the doctor reservoir being operated at a below atmospheric pressure level. Under negative pressure conditions, leakage of coating liquid is virtually non-existent, and the operating life of the end seals is substantially increased.

According to another aspect of the present invention, visual and audible alert signals are provided by a vacuum sensor assembly which is coupled to the evacuated space within the doctor reservoir. The sensor assembly includes vacuum gauge which provides a visual indication of the suction pressure within the evacuated space within the doctor reservoir. A vacuum sensor switch is also coupled to the evacuated space for selectively applying electrical power to an audio transducer when the pressure within the evacuated space of the doctor chamber rises above a predetermined safe operating vacuum level.

The operation and advantages of the present invention will be understood from the following detailed description taken with reference to the accompanying drawings wherein:

FIGURE 1 is a schematic side elevational view of a sheet-fed, offset rotary printing press having a coating apparatus embodying the present invention;

FIGURE 2 is an enlarged fragmentary side elevational view taken substantially within the circular area designated "2" in FIGURE 1 and showing the coating apparatus of the present invention during coating operation;

FIGURE 3 is an enlarged fragmentary perspective view showing one side of the coating apparatus mounted in the press and illustrating the fluid path of coating material from a remote supply drum to a doctor reservoir in the coating unit;

FIGURE 4 is an enlarged fragmentary sectional view taken substantially along the line 4-4 of FIGURE 3;

FIGURE 5 is a simplified flow diagram which illustrates a dual pump arrangement for circulating coating liquid from a remote supply drum to the doctor reservoir and return;

FIGURE 6 is a simplified flow diagram which illustrates a single pump arrangement for circulating coating liquid by suction flow from a remote supply drum to the doctor reservoir and return;

FIGURE 7 is an enlarged fragmentary perspective view of one end portion of the doctor blade coating apparatus of the present invention;

FIGURE 8 is an enlarged sectional view taken substantially along the line 8-8 of FIGURE 7; and,

FIGURE 9 is a view similar to FIGURE 8 which includes a suction pressure sensing circuit for providing a visual indication of suction pressure and an audible alert signal when the suction/vacuum pressure inside the evacuated space of the doctor reservoir rises above a safe operating level, thereby signaling an impending or potential failure of the doctor blades or of the end seals.

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line doctor blade apparatus, herein generally designated 10, for use in applying a protective and/or decorative coating or inks to the freshly printed surface of sheets printed in a sheet-fed or web-fed, offset rotary or flexographic printing press, herein generally designated 12. In this instance, as shown in FIGURE 1, the doctor blade coating apparatus 10 is installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation Heidelberg Speedmaster 102V, and which includes a press frame 14 coupled at one end, herein the right end, with a sheet feeder 16 from which sheets, herein designated 18, are individually and sequentially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the finally printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical sheet printing stations 22, 24, 26 and 28 which can print different color inks onto the sheets as they are moved through the press 10.

As illustrated, each of the printing stations 22, 24, 26 and 28 is substantially identical and of conventional design, herein including a sheet-fed cylinder 30, a plate cylinder 32, a blanket cylinder 34 and an impression cylinder 36, with each of the first three printing stations 22, 24 and 26 having a transfer cylinder 38 disposed to withdraw the freshly printed sheets from the adjacent impression cylinder 36 and transfer the freshly printed sheets to the next printing station via a transfer drum 40. The final printing station 28 herein is shown as equipped with a delivery cylinder 42 which functions to support the printed sheet 18 as it is moved from the final impression cylinder 36 by a delivery conveyor system, generally designated 44,

to the sheet delivery stacker 20.

The delivery conveyor system 44 as shown in FIGURE 2 is of conventional design and includes a pair of endless delivery gripper chains 46, only one of which is shown carrying at regular spaced locations along the chains, laterally disposed gripper bars 48 having gripper elements 50 used to grip the leading edge E of a sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing station 28. As the leading edge E of the sheet 18 is gripped by the grippers 50, the delivery chains 46 pull the sheet 18 away from the impression cylinder 36 and convey the freshly printed sheet to the sheet delivery stacker 20 where the grippers release the finally printed sheet.

The endless delivery chains 46 are driven in synchronous timed relation to the impression cylinder 36 by sprocket wheels 52 fixed adjacent the lateral ends of a delivery drive shaft 54 which has a mechanically geared coupling connected to the press drive system. The delivery drive shaft 54 extends laterally between the sides of the press frame 14 adjacent the impression cylinder 36 of the last printing station 28, and is disposed to be parallel with the axis of the impression cylinder. In this instance, the delivery cylinder 42, which is constructed to allow adjustments in diameter by suitable means, is attached to the delivery drive shaft 54 so that the delivery cylinder is also rotated in precise timed relation with the impression cylinder.

In this respect, it is important to note that when the freshly printed sheets 18 are conveyed away from the impression cylinder 36 of the final printing station 28 by the gripper 50 carried by the delivery chains 46, the wet inked surfaces of the sheets face the delivery drive shaft 54. Consequently, the sheets should be supported such that the wet ink is not smeared as the sheets are transferred. Typically, such support has been provided by skeleton wheels or cylinders mounted to the press delivery drive shaft 54, or as is now more commonly used, net equipped delivery cylinders as described in U.S. Patent 4,402,267 to Howard W. DeMoore, entitled "Method and Apparatus for Handling Printed Sheet Material".

More recently, vacuum transfer apparatus of the type disclosed in U.S. Patent 5,127,329, to Howard W. DeMoore, entitled "Vacuum Transfer Apparatus for Sheet-Fed Printing Presses", has been used. The vacuum transfer apparatus may be used in place of delivery cylinders or skeleton wheels to pull the unprinted side of the sheet away from the delivery drive shaft 54 so that the wet ink surface of the sheets do not come into contact with any press apparatus.

In accordance with the present invention, the inline doctor blade coating apparatus 10 for applying the protective or decorative coating or ink to the sheets 18 enables the press 12 to be operated in the normal manner without the loss of the final printing station 28, and without requiring any substantial press modifications by employing the existing press delivery drive shaft 54 as the mounting location for a delivery transfer cylinder 42 which has been equipped with a liquid material coating blanket B. In presses having delivery systems such as skeleton wheels mounted on the delivery drive shaft 54 or a vacuum transfer apparatus as disclosed in U.S. Patent 5,127,329, conversion to a coating operation may be quickly and easily accomplished by mounting on the press delivery drive shaft 54 in place of the skeleton wheels or in addition to the vacuum transfer apparatus, a blanket-equipped delivery transfer cylinder 42 capable of performing a blanket coating function as well as the delivery transfer function. By utilizing a blanket modified delivery cylinder 42 mounted on the delivery drive shaft 54 to also act as a blanket cylinder, protective coating may be applied to the printed sheet 18 in precise timed registration, and will permit the press 12 to be operated with its full complement of printing stations.

For that purpose, the coating apparatus 10 of the present invention includes a relatively simple, positive acting and economical doctor blade coating unit, generally designated 60, mounted to the press frame 14 downstream of the delivery drive shaft 54 and positioned to apply liquid coating material to the coating blanket B mounted on a delivery transfer cylinder 42 which is secured to the delivery drive shaft 54. As shown in FIGURES 2, 3 and 4, the doctor blade coating unit 60 herein comprises a pair of side frames 62, only one of which is shown, it being understood that the other side frame is substantially the same as that of the side frame illustrated, attached to each side of the press frame 14. Pivotally mounted to one end of each of the side frames 62 is a support bracket 64 carrying one end of a doctor blade reservoir 66 and a cooperating liquid material applicator roller 68 each disposed to extend laterally across the press 12 parallel with the delivery drive shaft 54. The coating unit 60 is mounted between the upper and lower runs of the delivery chains 46 downstream of the delivery drive shaft 54, and positioned so that the outer peripheral surface 70 of the applicator roller 68 can be engaged against the coating blanket B on the delivery cylinder 42 mounted on the delivery drive shaft 54.

As shown in FIGURES 2 and 3, the support bracket 64 is pivotally attached to the end of the side frame 62 by a shaft 72 disposed at the lower end portion of the bracket, and can be pivoted about the shaft by an extensible cylinder 74, herein shown as a pneumatic cylinder, one end 76 of which is secured to the side frame, and the opposite end 78 of which is coupled through a pivot shaft 79 to the upper end portion of the bracket. By extending or retracting the cylinder 74, the extent of engagement of the applicator roller 68 against the surface of the coating blanket B of the delivery cylinder 42 may be controlled, and the appli-

cator roller 68 may be completely disengaged from the transfer coating blanket B in an idle position.

The coating applicator roller 68, which is of conventional design and preferably having an engraved ceramic or chrome outer peripheral surface 70, is designed to pick up a predetermined volume of liquid coating material or ink from the doctor reservoir 66, and then uniformly transfer the liquid coating material to the blanket B on the transfer delivery cylinder 42. To effect rotation of the applicator roller 68, a drive motor 80, either hydraulic or pneumatic, is attached to one of the side frames 62 and coupled to a source of pressurized fluid (not shown) through fittings 81A, 81B. Attached to the output of the drive motor 80 is an output gear which is drivingly coupled through a cluster gear 82 and a series of idler gears 83 each mounted on stub axles 84, to a drive gear 86 attached to the end of a shaft 88 on which the applicator roller 68 is concentrically mounted. The shaft 88 of the applicator roller 68 is, in turn, journaled at each end to the brackets 64 through a releasable semicircular collar 90 attached by bolts 92 to the bracket. Herein, the axle of the terminal idler gear, designated 83', also serves as the shaft 72 for pivotally mounting the support bracket 64 to the side frame 62 so that when the bracket is rotated about the shaft, the terminal idler gear remains engaged with the drive gear 86 of the pickup roller 68.

In this arrangement, as can best be seen in FIGURE 4, the applicator roller 68 has a peripheral surface portion 68P which projects radially into the doctor blade reservoir 66 containing a supply of coating material or ink. A pair of upper and lower inclined doctor blades 94 and 96 attached to the doctor blade head 98 on shoulders 98A, 98B engage the applicator roller surface to doctor the excess liquid coating material or ink picked up from the reservoir by the engraved surface 70 of the roller.

The reservoir cavity 66 is formed within an elongated doctor blade head 98 having a generally C-shaped cross-section with an opening 100 extending longitudinally along one side facing the applicator roller 68. The reservoir 66 is supplied by flow circulation means with liquid material or ink drawn from a supply drum 102 disposed at a remote location within or near the press 12. Preferably, the doctor blade head 98 is removably attached to the brackets 64, herein by bolts 104 having enlarged, knurled heads 106, and which can be threaded through slots 108 formed in the brackets to clamp the reservoir in place on the brackets.

To insure that an adequate supply of liquid coating material is always present within the doctor reservoir 66 and to prevent coagulation and clogging of the doctor blades 94 and 96 by the liquid coating material or ink, the coating material or ink is circulated through the doctor reservoir by flow circulation means comprising at least one suction pump, and preferably by a supply pump 110 and a return pump 112 as shown in FIGURE 5, and supply and return conduits 114, 116. The supply pump 110 draws the liquid material L from the supply drum 102 via a supply conduit 114 and discharges it into a bottom region of the doctor reservoir 66 through a delivery port 114P, and the return pump 112 induces suction flow in a pair of return conduits 116A, 116B coupled adjacent an upper evacuated chamber region of the reservoir through return ports 116P, 116Q for withdrawing excess liquid coating material or ink from the reservoir. By supplying the coating material or ink from the supply drum 102 at a greater rate than the rate of transfer of liquid material by the applicator roller 68, a adequate supply of coating material or ink will always be present within the doctor reservoir 66. The excess coating material or ink which rises above the liquid level of the return port R (FIGURE 8) is suctioned away by the suction return pump 112.

According to an important feature of the present invention, the doctor reservoir 66 is not pressurized as taught by the prior art. Instead, coating liquid or ink is supplied to the doctor reservoir 66 by the suction flow produced by the return pump 112. In this arrangement, the return pump 112 applies a vacuum or suction force in the doctor reservoir which draws liquid material L from the supply drum 102 through the supply conduit 114 to the doctor reservoir 66 and draws excess liquid material L from the doctor reservoir 66 through the return conduit 116 into the remote supply drum 102 at a rate which is greater than the rate that liquid coating material or ink is being supplied to the doctor blade reservoir through the supply conduit 114. Because the suction return flow rate is greater than the supply flow rate, excess coating material and air are evacuated from the upper chamber region of the doctor reservoir, a positive pressure condition within the doctor reservoir is avoided, and a below atmospheric vacuum pressure level is established.

Referring to FIGURE 5, FIGURE 6, FIGURE 7 and FIGURE 8, the liquid material L is delivered by the supply conduit 114 through a supply port 114P into the lower region of the doctor reservoir 66, and is withdrawn from the doctor reservoir through a return port 116P in an upper chamber region of the chamber through the return conduits 116A, 116B. The liquid level elevation of the return port 116P is preferably selected to provide for the accumulation of liquid coating material or ink in more than about half of the doctor reservoir, thereby insuring that the engraved surface of the applicator roller 68 will be thoroughly wetted by the coating material or ink L as it turns through the doctor reservoir. The doctor reservoir 66 is bounded vertically by lower and upper doctor head shoulders 98A, 98B. Accordingly, the return ports 116P, 116Q of return lines 116A, 116B are located at a liquid level R intermediate the limits establish-

ed by the lower and upper shoulders. Any excess liquid coating material or ink which rises above the liquid level R of the return ports will be suctioned away by the return pump 112.

It will be appreciated that the supply pump 110 is optional, and that the suction circulation system may be operated effectively with only the single suction return pump 112 as shown in FIGURE 6. In the single pump configuration, it may be necessary to prime the supply conduit 114 to obtain satisfactory operation. The two pump arrangement as shown in FIGURE 5 is preferred for those installations in which the supplu drum 102 is located at a distance that is too far from the press to achieve adequate suction flow. The auxiliary supply pump 110 provides positive flow input to the doctor blade reservoir at a fixed flow rate. The return suction pump 112 has a faster suction return flow rate than the supply flow rate. Consequently, a positive pressure buildup in the doctor reservoir cannot occur. By utilizing two pumps as shown in FIGURE 5, the liquid level within the doctor reservoir 66 may be closely controlled, without positive pressure buildup, thereby reducing leakage through the end seals.

Referring to FIGURE 8, it will be appreciated that the doctor reservoir 66 is maintained at a pressure level below atmospheric by the suction action of the return flow pump 112. The coating liquid L rises to the liquid level of the return port R and is drawn off immediately by the suction pump 112. Additionally, air within the doctor blade chamber 66 is also evacuated, thereby reducing the doctor blade chamber pressure to a level below ambient atmospheric. This negative pressure differential condition opposes leakage of coating liquid L through the end seals. Since the doctor reservoir 66 is not positively pressurized, the end seals are operated under favorable pressure differential conditions, thereby extending their useful lifetime. Moreover, the negative pressure differential doctor blade assembly will accommodate an applicator roller having a chipped corner, which would leak under positive pressure conditions, but which does not leak because of the negative pressure reservoir condition established by suction flow.

It is useful for the press operator to have an advance warning of an impending end seal failure. With advance warning, the press operator can schedule repair and/or replacement of the doctor blades and the end seals at a convenient time, for example between press runs or before undertaking the next printing job, Apparatus for monitoring the suction/vacuum condition within the doctor chamber 66 is provided by a pneumatic sensor assembly 120 as shown in FIGURE 9. The pneumatic sensor assembly 120 includes a pneumatic sensor line 122 which is coupled in fluid communication with the doctor blade chamber 66 through a vacuum sensor bore 124 formed through the upper doctor head shoulder 98B. The vacuum sensor line 122 is coupled to the sensor bore 124 by a threaded fitting 126.

Continuous monitoring of the vacuum/suction condition within the doctor reservoir 66 is provided by a vacuum gauge 128 which can be of any conventional design, for example a Bourdon gauge which is calibrated for dry air and covers a range from about zero to about twenty torrs (about 20 millimeters of mercury). The vacuum gauge 128 is coupled into the sensor line 122 by a tee coupling 130. According to this arrangement, the press operator receives a continuous visual indication of the vacuum/suction condition within the doctor blade chamber 66.

According to another aspect of the invention, the vacuum/suction line 122 is coupled to a vacuum switch 132. The vacuum switch 132 has a conductive, movable diaphragm 134 which is movable into and out of electrical contact with switch electrodes 132A, 132B. That is, the diaphragm 134 is pulled out of contacting engagement with the switch electrodes 132A, 132B when the vacuum/suction level in the doctor reservoir 66 is below a predetermined level. When the pressure level within the doctor reservoir 66 rises above that preset level, for example in response to leakage of air through the end seals or around a worn doctor blade 94, the vacuum pressure within the vacuum chamber 132C of the sensor switch also rises, thereby permitting the conductive switch element 134 to engage the switch electrodes 132A, 132B.

When switch closure occurs, electrical power is applied to an audio transducer 136 from a power source 138. Electrical current is conducted through the pneumatic switch 132 to the audio transducer 136 through power conductors 140, 142. According to this arrangement, the press operator will receive an audible alert as soon as the suction/vacuum pressure in the doctor blade chamber rises above a safe operating level, thereby signaling wear failure of the doctor blades and/or an impending failure of the end seals.

From the foregoing, it should be apparent that the coating apparatus 10 of the present invention provides a highly reliable, effective and economical in-line apparatus for applying coating material to the freshly printed sheets 18 in a sheet-fed, offset rotary printing press 12 which allows the final printing station to continue to be used as a print station, yet which does not require any substantial press modification or the addition of a separate timed applicator roller, and which inhibits end seal leakage.

Claims

1. Coating apparatus (10) for applying liquid material (L) from a a supply drum (102) to an applicator roller (68) which is engagable in an operative position with a doctor blade head (60) having an elongated reservoir (66) for receiving liquid material from the supply drum, said doctor blade head be-

ing adapted to extend in parallel with the applicator roller in the operative position with a portion of the peripheral surface (68P) of the applicator roller extending into said reservoir for wetting contact with liquid material contained therein, and including doctor blade means (94, 96) attached to the doctor blade head for engagement against the peripheral surface of the applicator roller in the operative position, characterized in that:

circulation means are coupled to the doctor reservoir (66) for inducing the flow of liquid material from said supply drum into the doctor reservoir and for returning liquid material by suction flow from the doctor reservoir to the supply drum.

2. Coating apparatus (10) as defined in claim 1, said circulation means comprising

a supply conduit (114) connecting the supply drum in flow communication with the doctor reservoir;

a return conduit (116) connecting the doctor reservoir in flow communication with the supply drum; and,

a first pump (112) coupled in series flow relation with the return conduit for inducing suction flow of liquid material from the supply drum through said supply conduit into the doctor reservoir, and for inducing suction flow of liquid material from the doctor reservoir through the return conduit into the supply drum.

3. Coating apparatus (10) as defined in claim 2, wherein the return conduit (116) is coupled in flow communication with the doctor reservoir (66) at a first liquid level location (116P) and the supply conduit (114) is coupled in flow communication with the doctor reservoir at a second liquid level location (114P), the first liquid level location of the return conduit being higher in elevation than the second liquid level location of the supply conduit when the doctor blade head (60) is in the operative position.

4. Coating apparatus (10) as defined in any one of claims 1 to 3 wherein said circulation means comprises:

a second pump (110) coupled in series flow relation with said supply conduit (114) for pumping liquid material (L) from the supply drum (102) to the doctor reservoir (66).

5. Coating apparatus (10) as defined in claim 4, characterized in that the suction return pumping rate of said first pump (112) is greater than the supply pumping rate of said second pump (110).

6. Coating apparatus (10) as defined in any one of the preceding claims wherein the doctor blade head (60) has first and second shoulders (98A,98B) forming lower and upper liquid level boundaries for said reservoir, respectively, and said circulation means includes a return conduit (116) coupled in flow communication with said reservoir (66) at a liquid level location (R) disposed intermediate the liquid level boundaries established by said first and second shoulders.

7. Coating apparatus as defined in any one of the preceding claims wherein a pneumatic conduit (122) is coupled to the reservoir (66) for sensing air vacuum pressure within the reservoir, and a vacuum gauge (128) is coupled to the pneumatic conduit for providing a visual indication of air vacuum pressure in the reservoir.

8. Coating apparatus as defined in any one of claims 1 to 6 wherein a pneumatic conduit (122) is coupled to the reservoir (66) for sensing air vacuum pressure within the reservoir, a vacuum responsive switch (132) having switch electrodes (132A,132B) is coupled to said pneumatic sensor conduit, and an audio transducer (136) is electrically connected to the switch electrodes for making and breaking an electrical circuit from a power source (138) to said audio transducer.

9. Coating apparatus (10) as defined in any one of the preceding claims wherein means are coupled to the reservoir for supplying and evacuating liquid material to and from the reservoir (66) at differential flow rates, respectively, whereby a lower chamber region of the reservoir is maintained in a filled condition and an upper chamber region of the reservoir is maintained in an evacuated condition.

10. Coating apparatus (10) as defined in any one of the preceding claims wherein means (62,64) are provided for mounting the coating apparatus on the side frame (14) of a printing press (12) adjacent to a transfer delivery cylinder (42), a liquid material coating blanket (B) is secured to the transfer delivery cylinder, and including means (74) for extending the applicator roller (68) into engagement with the coating blanket in the operative position, and for retracting the applicator roller out of engagement with the coating blanket in an idle position.

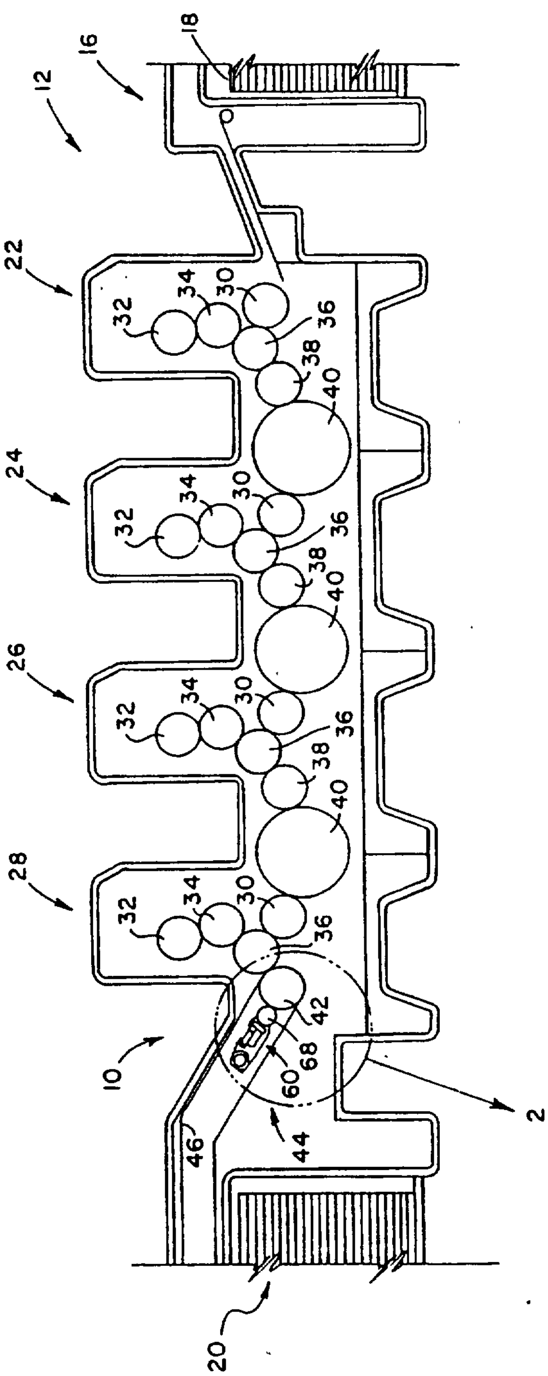
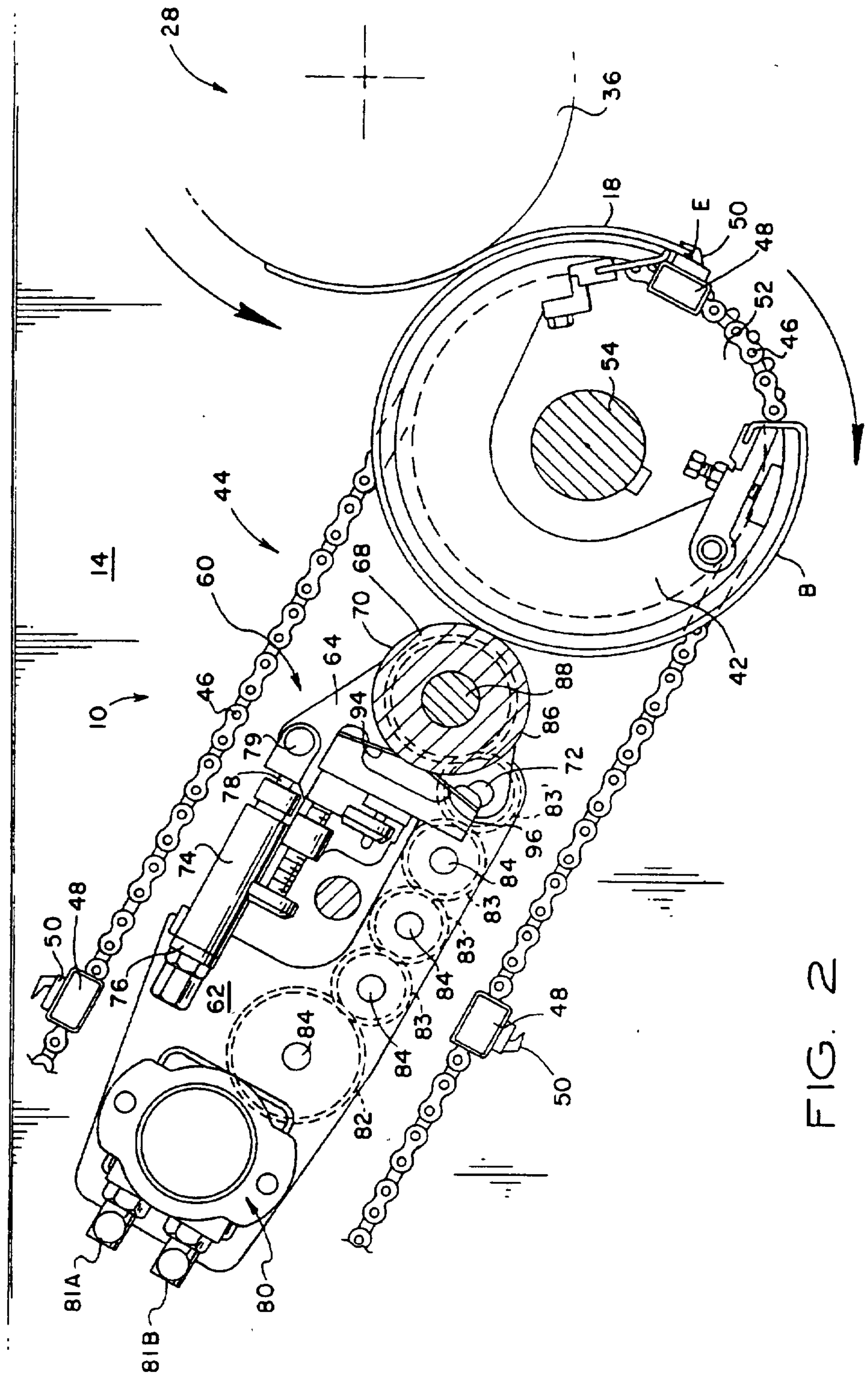


FIG. 1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72
78
83'
96
74
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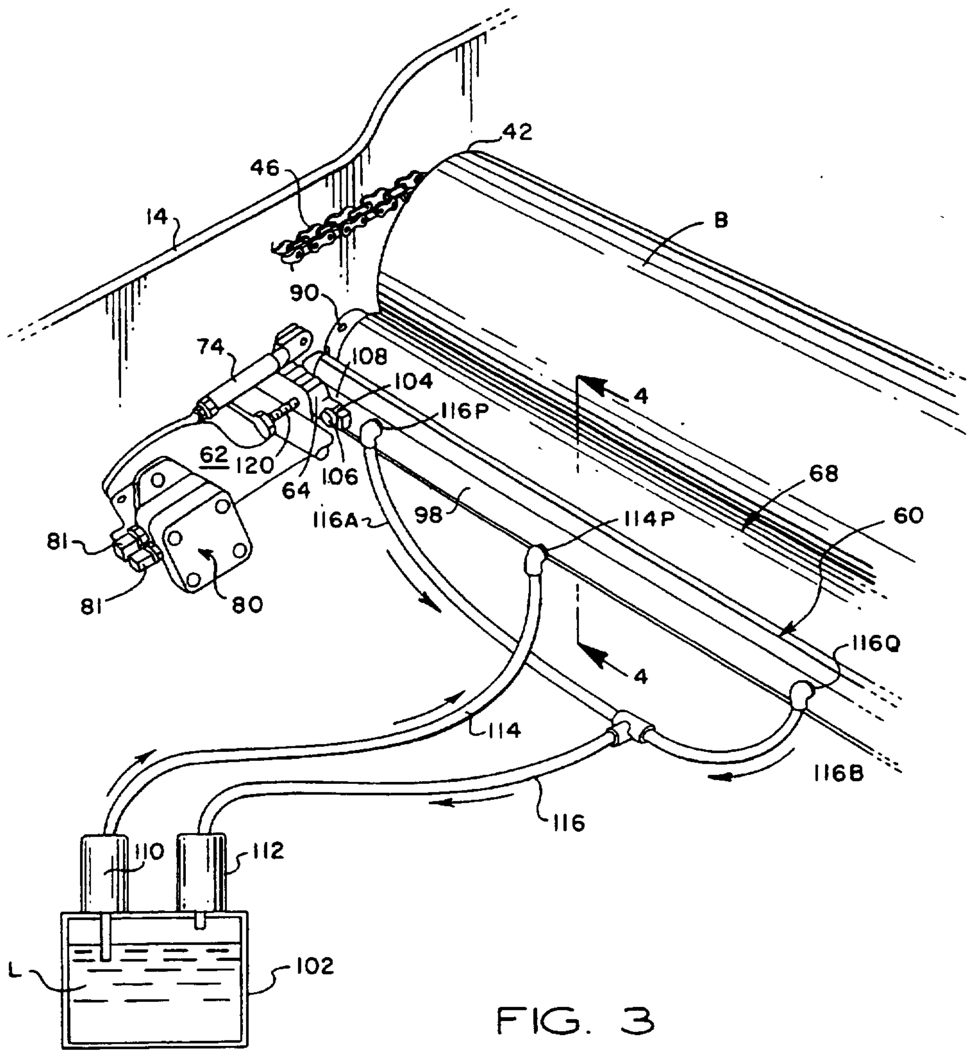
80
81A
81B

FIG. 2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112
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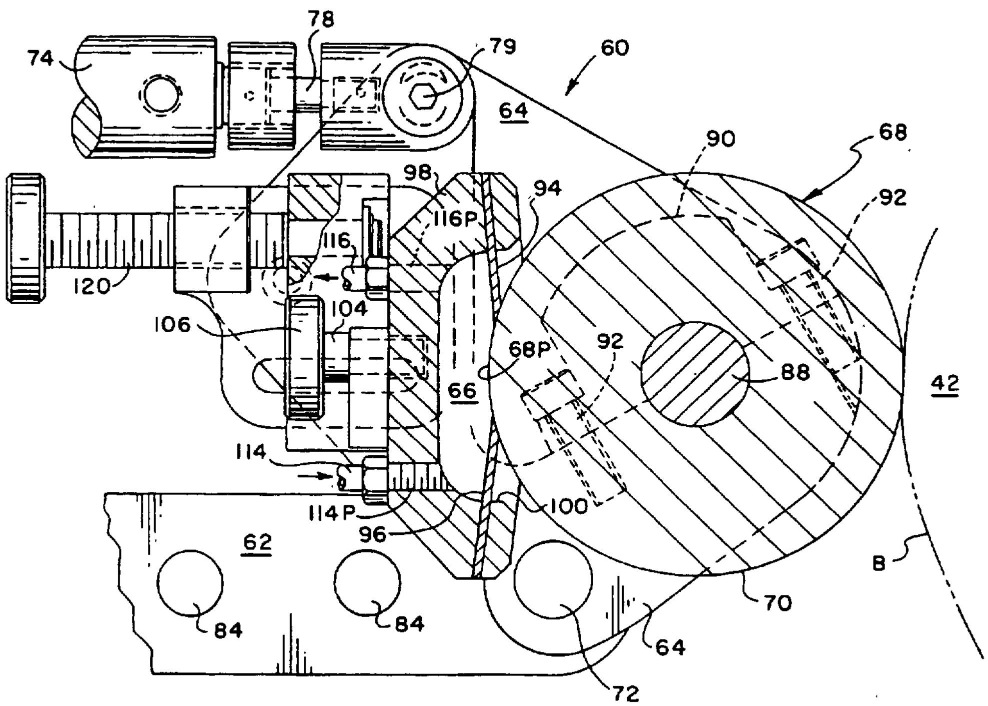
102

FIG. 3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116P
116
120
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42
66
114
114P
100
96
62
84
84
70
B
64
72

FIG. 4

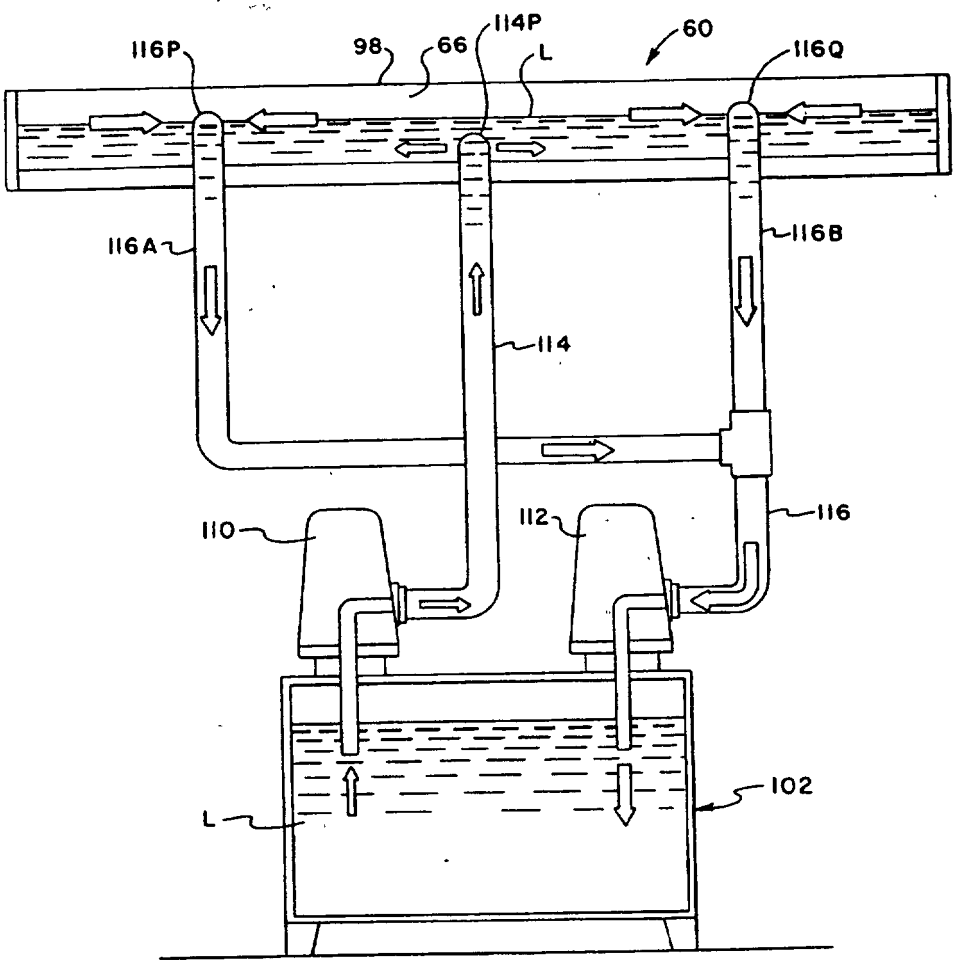

FIG. 5

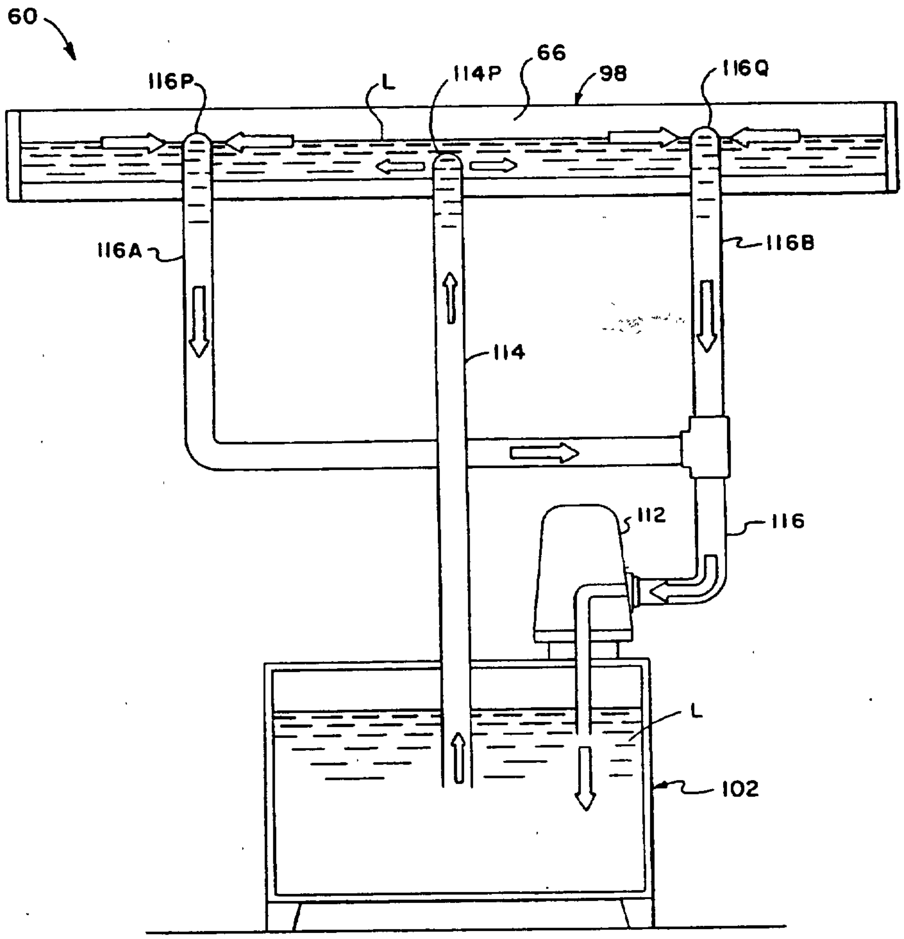

FIG. 6

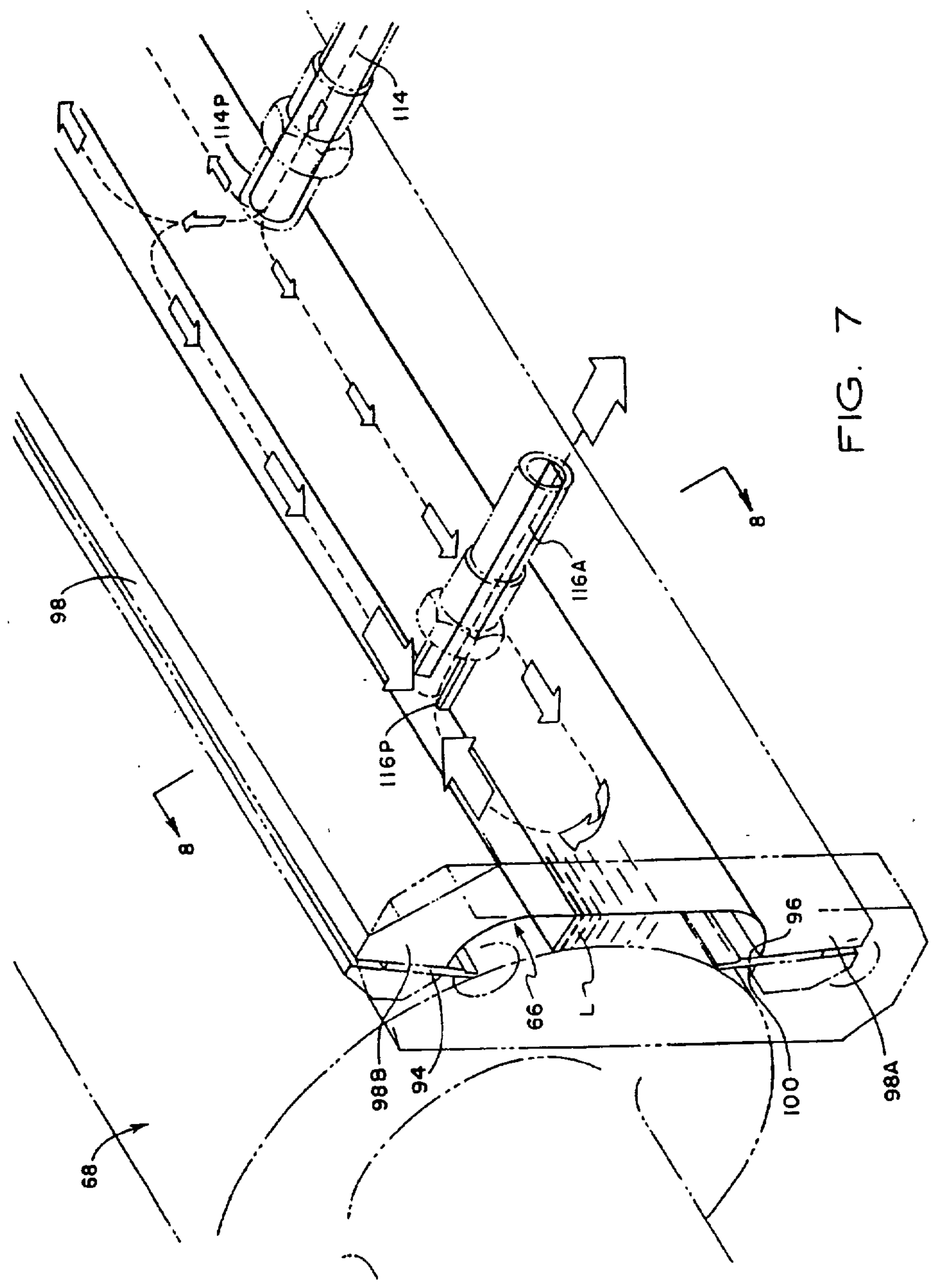

FIG. 7

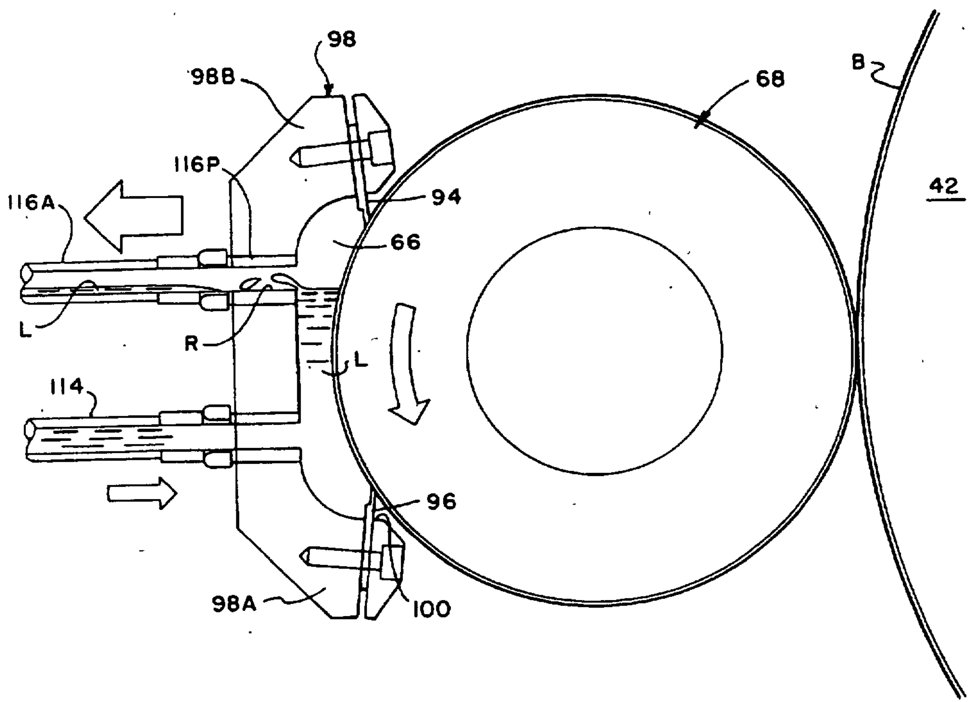

FIG. 8

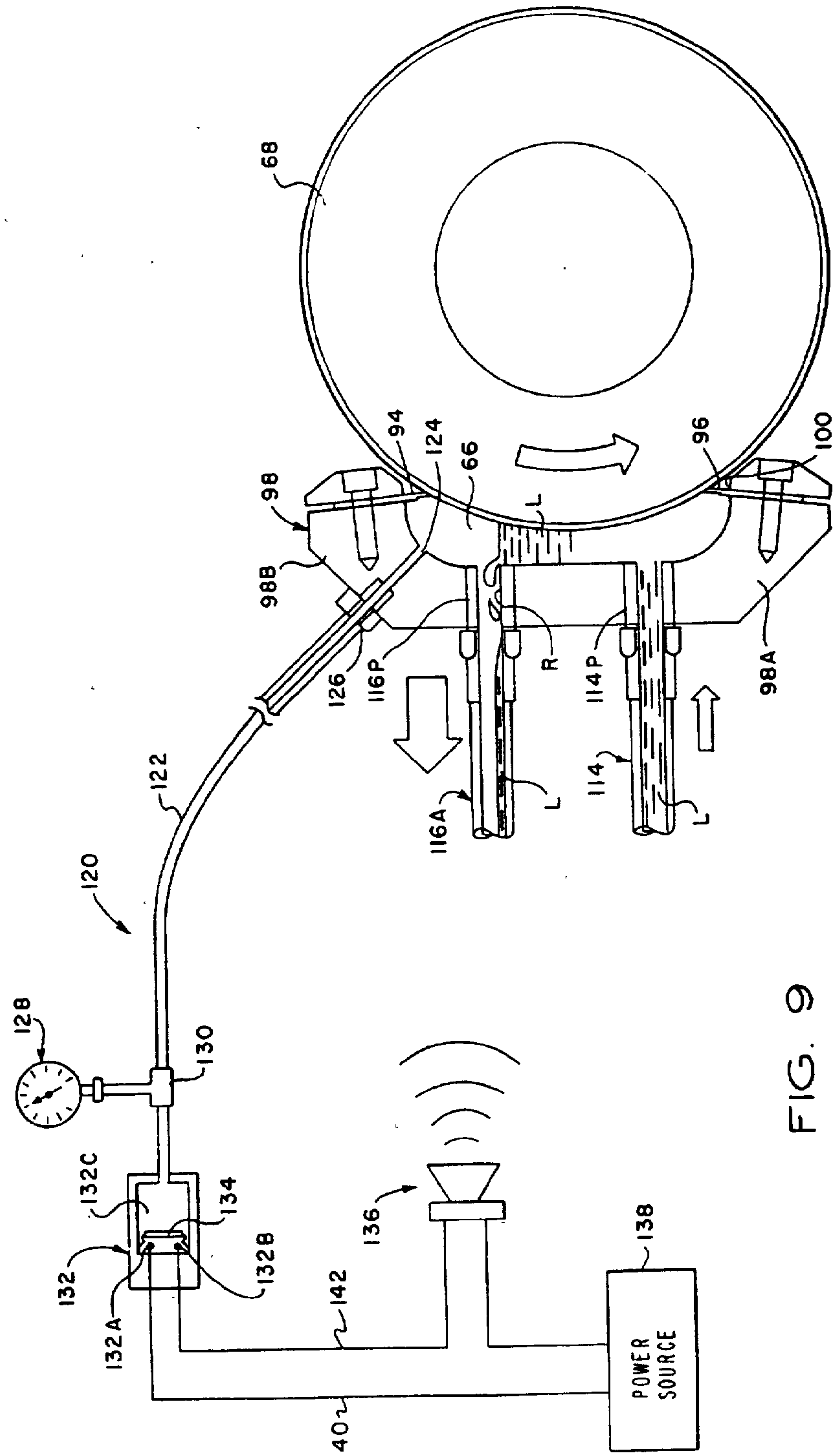
68
94
124
66
96
100
98
98B
L
116P
R
114P
98A
126
122
116A
L
114
L
120
128
130
132C
134
132
132B
132A
136
142
138
140
POWER SOURCE

FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 3265

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 461 426 (ROCKWELL INTERNATIONAL)		B41F23/08 B05C1/08
A	US-A-4 879 949 (ILDVACO ENGINEERING)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B41F B05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 SEPTEMBER 1993	LONCKE J.W.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

US005176077A

United States Patent [19]

DeMoore et al.

[11] Patent Number: 5,176,077
[45] Date of Patent: Jan. 5, 1993

[54] COATING APPARATUS FOR SHEET-FED, OFFSET ROTARY PRINTING PRESSES

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[73] Assignee: Howard W. DeMoore, Dallas, Tex.

[21] Appl. No.: 752,778

[22] Filed: Aug. 30, 1991

[51] Int. Cl.[5] B41F 9/00
[52] U.S. Cl. 101/142; 101/147; 101/232; 101/348; 118/46
[58] Field of Search .... 101/135, 424.1, 142, 101/148, 155, 157, 177, 217, 232, 246, 329, 330, 331, 408, 409, 419, 422, 348-349; 118/46, 211, 236, 249, 257, 258, 261, 262, 263, 206, DIG. 15

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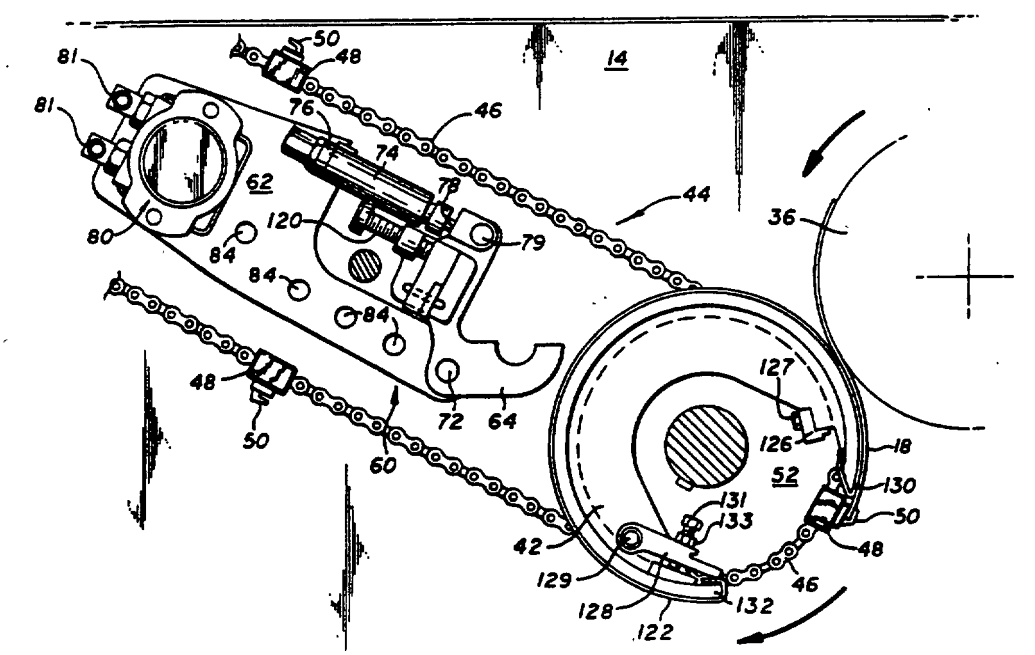
Attorney, Agent, or Firm—Dennis T. Griggs

[57] ABSTRACT

A coating apparatus for use in a sheet-fed, offset rotary printing press to selectively apply a protective and/or decorative coating to the wet ink surface of freshly printed sheets and including a coating unit having a pick-up roller for supplying aqueous coating material from a reservoir to the surface of a delivery cylinder mounted on a press delivery drive shaft, the delivery cylinder performing the dual function of a coating applicator roller and a delivery cylinder during coating operations.

22 Claims, 5 Drawing Sheets



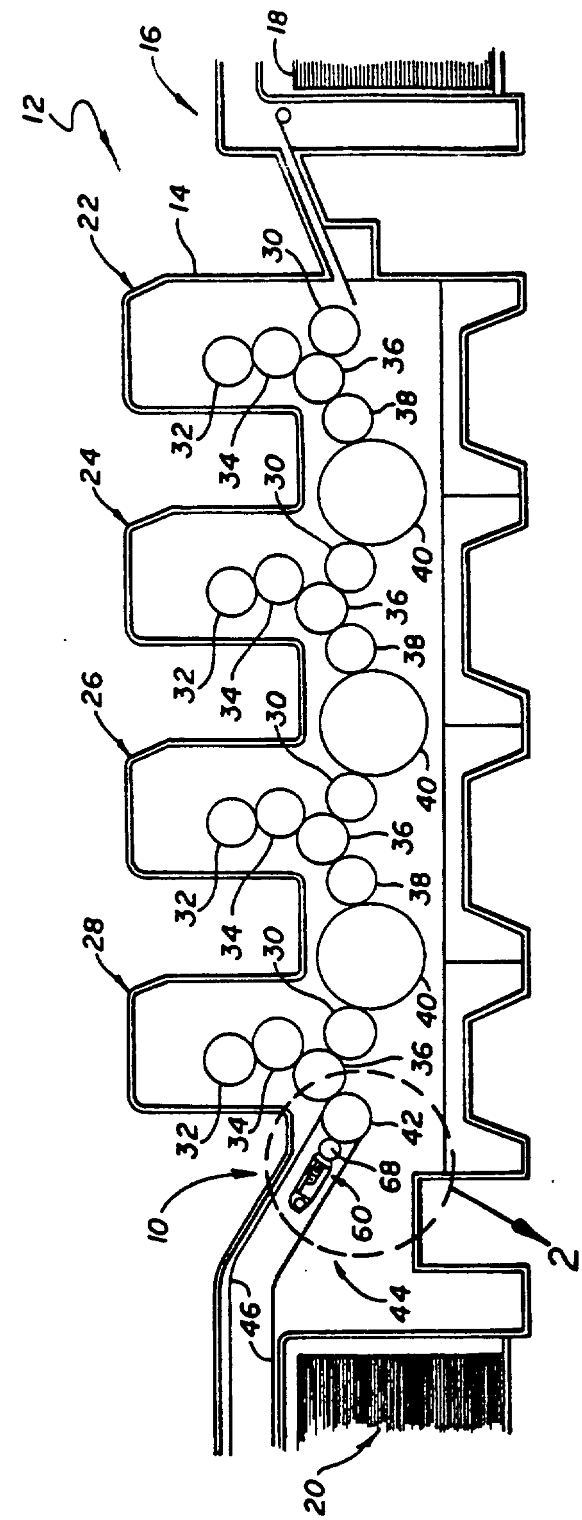


FIG. 1

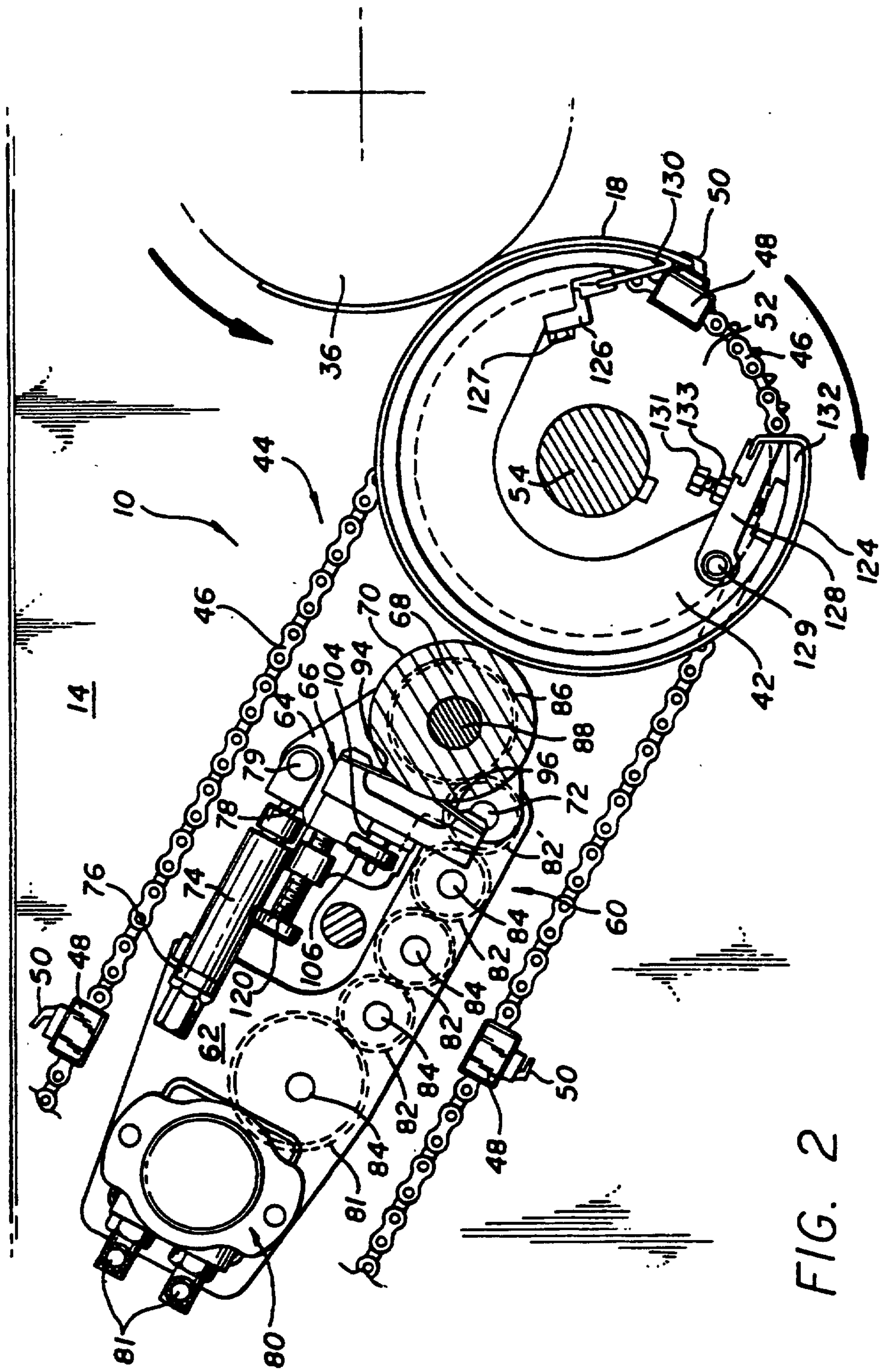


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FIG. 2

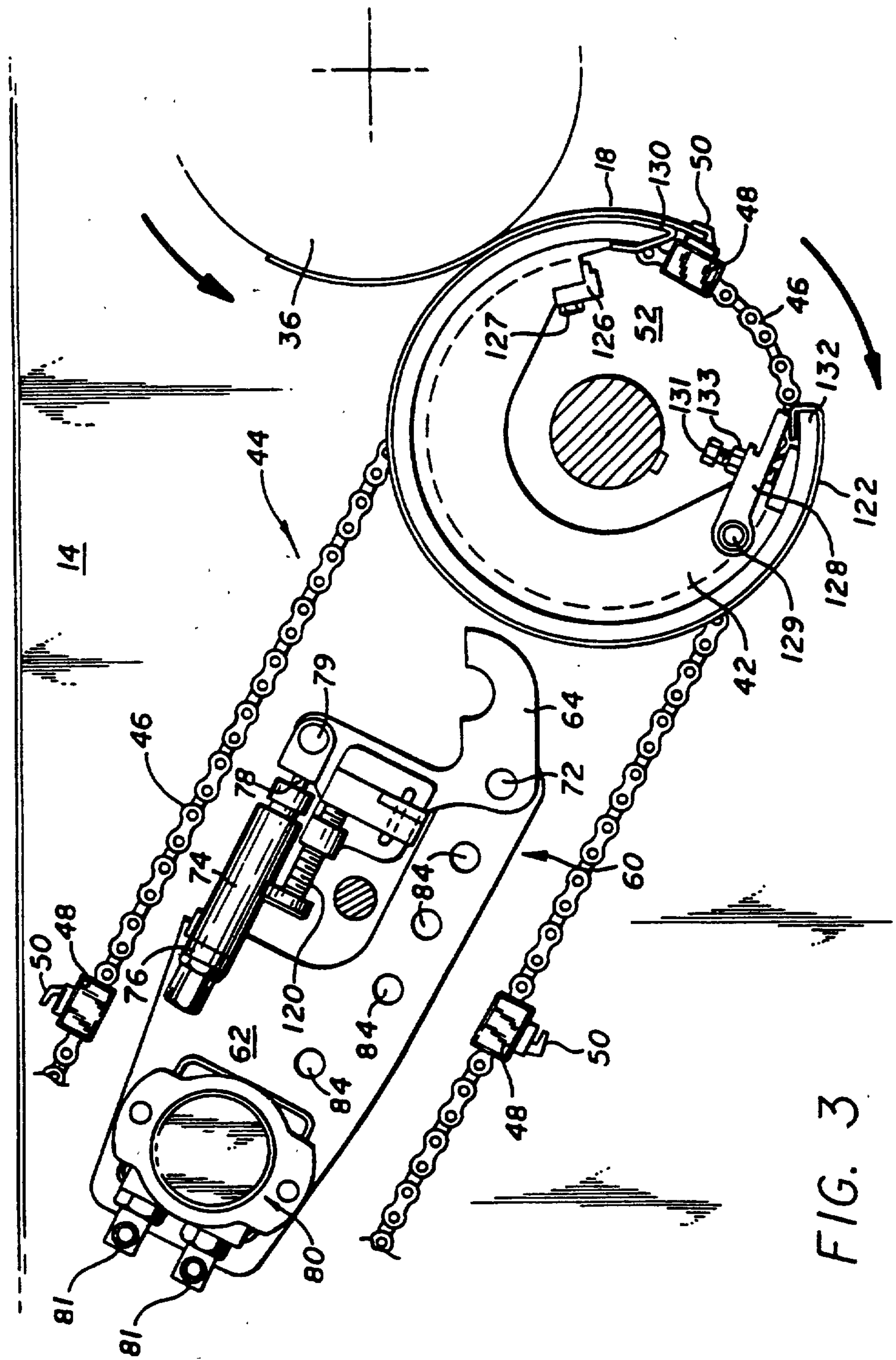
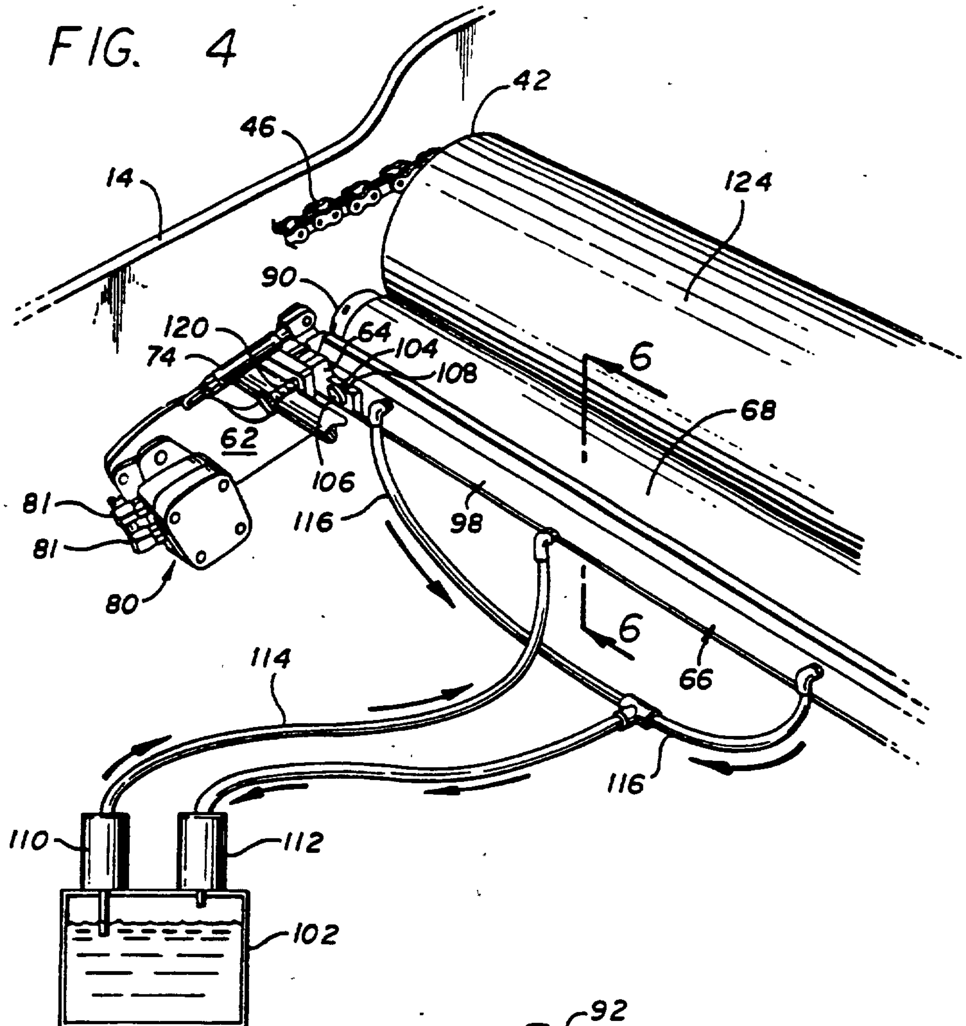


FIG. 3

FIG. 4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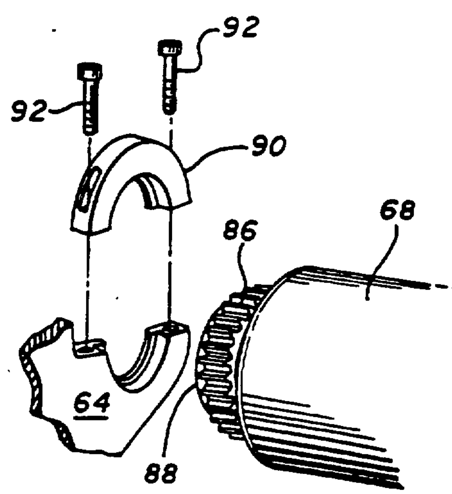
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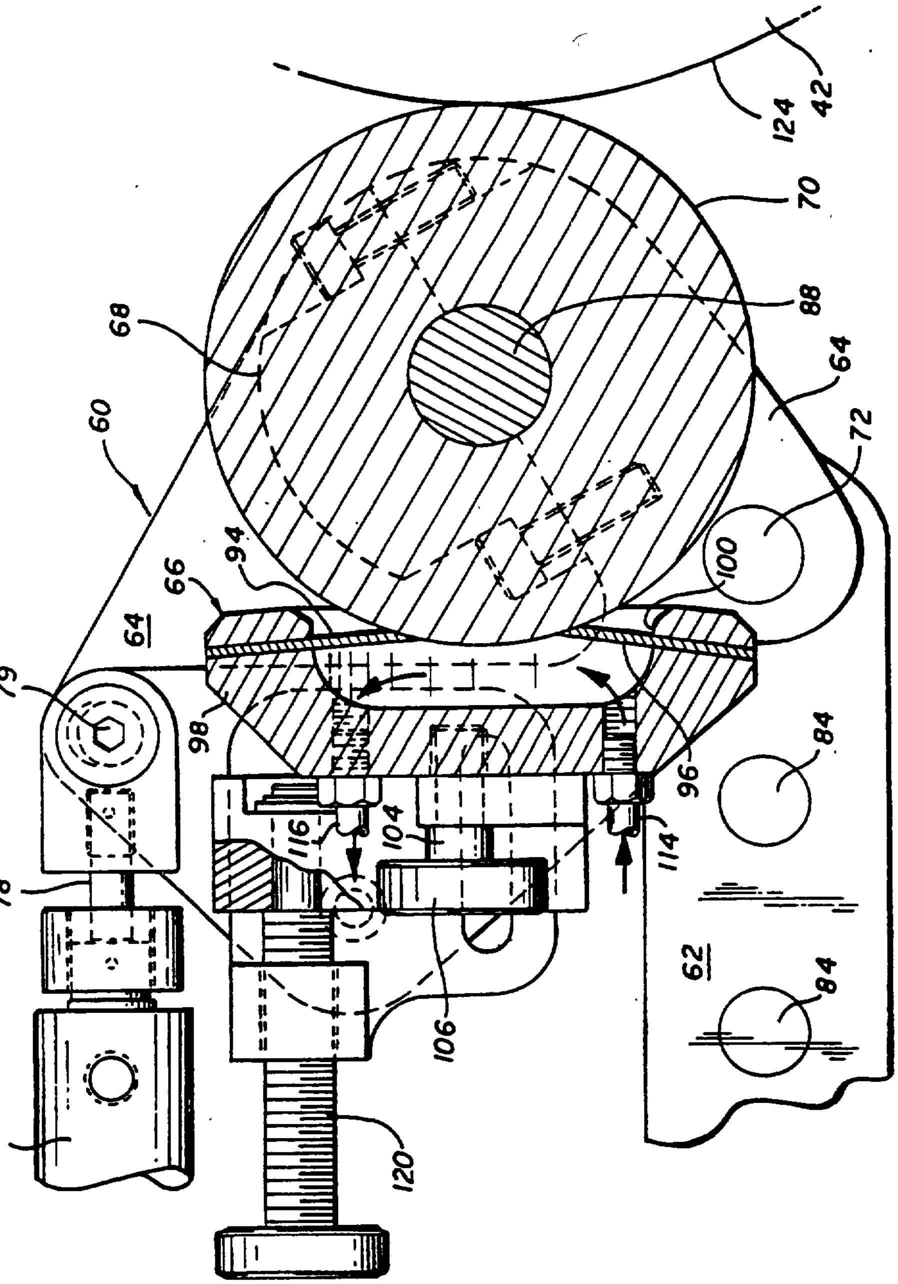
FIG. 5

FIG. 6



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COATING APPARATUS FOR SHEET-FED, OFFSET ROTARY PRINTING PRESSES

BACKGROUND OF THE INVENTION

This invention relates to sheet-fed, offset rotary printing presses, and more particularly, to a new and improved apparatus for the in-line application of protective and decorative coatings to the printed surface of freshly printed sheets.

Conventional sheet-fed, offset rotary printing presses typically include one or more printing stations through which individual sheets are fed and printed with wet ink. After final printing, the sheets are fed by a delivery conveyor system to the delivery end of the press where the freshly printed sheets are collected and stacked. In a typical sheet-fed, offset rotary printing press such as the Heidelberg Speedmaster line of presses, the delivery conveyor system includes a pair of endless gripper chains carrying laterally spaced gripper bars and grippers which are used to grip and pull freshly printed sheets from the impression cylinder and convey the sheets toward the sheet delivery stacker. The gripper chains are driven in precisely timed relation to the impression cylinder by gripper chain sprocket wheels laterally spaced between a delivery drive shaft mounted on opposite sides of the press frame, the delivery drive shaft being mechanically coupled by gears for synchronous rotation with the impression cylinder.

Since the inks used with offset type printing presses typically remain wet and tacky for some time after printing, special precautions must be taken to insure that the wet inked surface of the freshly printed sheets are not marked or smeared as the sheets are transferred from one printing station to another, and through the delivery system to the sheet delivery stacker. One system for insuring that the freshly printed sheets are not marked or smeared during transfer is the transfer or delivery cylinder system marketed by Printing Research, Inc., of Dallas, Texas under its registered trademark "SUPER BLUE" That system, which is made and sold under license, is made in accordance with and operates as described in U.S. Pat. No. 4,402,267, issued Sep. 6, 1983 to Howard W. DeMoore, the disclosure of which is incorporated herein by this reference. In that system, marking and marring of freshly printed sheets is prevented by employing transfer or delivery cylinders provided with a coating of friction reducing material such as PTFE (Teflon) over which are loosely mounted fabric covers, referred to in the trade as "nets", and which support the wet ink side of the freshly printed sheets as they are pulled from the impression cylinder. Typically, in a multi-color press employing the "SUPER BLUE" cylinder system, each transfer cylinder for conveying the freshly printed sheets from one printing station to the next is supplied with a "SUPER BLUE" transfer cylinder system, and the delivery cylinder for conveying the sheets from the last printing station to the sheet delivery stacker is supplied with a "SUPER BLUE" delivery cylinder system. As used hereinafter, the term "net type cylinder" is intended to refer to cylinders having fabric nets disposed over the support surface, such as of the general type disclosed in the aforementioned DeMoore U.S. Pat. No. 4,402,267 and exemplified by the "SUPER BLUE" cylinder system.

Another system which can be used to prevent marking and smearing of the freshly printed sheets is that

disclosed in U.S. application Ser. No. 07/630,308 filed Dec. 18, 1990 entitled Vacuum Transfer Apparatus for Sheet-Fed Printing Presses now U.S. Pat. No. 5,127,329. That application, the disclosure of which is also incorporated herein by reference, discloses an apparatus which can be employed to draw the unprinted side of a freshly printed sheet into engagement with rollers which support the sheet on the unprinted side during transfer or delivery of the sheet from the impression cylinder after printing so that the wet ink on the freshly printed sheet does not come in contact with other apparatus in the press. The vacuum transfer apparatus disclosed in that application can be used as an alternative to the net type cylinder system disclosed in the aforementioned DeMoore patent, or when used in a perfecting press, as a supplement to that system, the vacuum transfer apparatus being primarily intended for use when only one-sided sheet printing is being performed by the press, and the net type cylinder system being used when the press is operating in the perfector mode with two-sided sheet printing.

In some printing applications, it is desirable that the press be capable of applying a protective and/or decorative coating over all or a portion of the surface of the printed sheets. Such coatings typically are formed of a UV-curable or water-soluble resin applied as a liquid solution or emulsion by an applicator roller over the freshly printed sheets to protect the ink and improve the appearance of the sheets. Use of such coatings is particularly desirable when decorative or protective finishes are required such as in the production of posters, record jackets, brochures, magazines, folding cartons and the like. In cases where a coating is to be applied, the coating operation is carried out after the final ink printing has been performed, most desirably by an in-line coating application, rather than as a separate step after the printed sheets have been delivered to the sheet delivery stacker.

Various suggestions have been made for applying the coating as an in-line press operation by using the final printing station of the press as the coating application station. For example, in U.S. Pat. Nos. 4,270,483, 4,685,414, and 4,779,557 there are disclosed coating apparatus which can be moved into position to allow the blanket cylinder of the last printing station of a press to be used to apply a coating material to the sheets. In U.S. Pat. No. 4,796,556 there is disclosed a coating apparatus which can be selectively moved between the blanket cylinder or the plate cylinder of the last printing station of the press so that that station can be used as a coating station for the press. However, when coating apparatus of these types are used, the last printing station can not be used to apply ink to the sheets, but rather can only be used for the coating operation. Thus, with these types of in-line press coating apparatus, the press loses the capability of printing its full range of colors since the last printing station is converted to a coating station.

Suggestions for overcoming the problem of the loss of a printing station when coating is desired have also been made, such as that set forth in U.S. Pat. Nos. 4,934,305 which discloses a coating apparatus having a separate timed applicator roller positioned to apply the coating material to the printed sheet while the sheet is on the last impression cylinder of the press. This is said to allow the last printing station to be operated simultaneously as both an ink application station and a coating

station so that no loss of press printing unit capability results. Another approach to providing a coating station without loosing the printing capabilities of the last printing station is to provide a totally separate coating unit down stream of the last printing station so that the coating is applied to the sheets after final printing and before the sheets have reached the sheet delivery stacker. Such an approach is suggested in U.S. Pat. Nos. 4,399,767 and 4,706,601. While each of these suggestions provide coating stations which allow the final printing station to continue to be used for printing, they each suffer from the disadvantages of requiring the provision of separately driven coating applicator rollers and apparatus which must be precisely timed in relation to the movement of the sheet to be coated so as to insure precise registration between application of the coating material and the printed sheet. The provision of separate timed applicator rollers require that the presses be modified to provide sufficient space within the presses to accommodate the added coating apparatus or to increase the length of the presses, and require additional and complex drive connections with the press drive system to achieve the required precise speed correlation between the sheets and the applicator rollers. Such modifications can be both expensive and cumbersome to install and maintain.

Thus, there exists a need for a new and improved in-line apparatus for use in a sheet-fed, offset rotary printing press to selectively apply a protective and/or decorative coating to the printed surface of freshly printed sheets which allows the final press printing station to continue to be used as a printing station, yet which does not require any substantial press modification or the addition of a separate timed applicator roller. As will be explained in more detail hereinafter, the present invention solves this need in an novel and unobvious manner.

SUMMARY OF THE INVENTION

The present invention provides a new and improved in-line apparatus for selectively applying a protective and/or decorative coating to the surface of freshly printed sheets in a sheet-fed, offset rotary printing press which is highly reliable and effective in use, yet which does not require any expensive or substantial press modification or result in any impairment of normal press operating capability. The present invention enables the press to be used to selectively apply the coating material to the freshly printed sheets as the sheets are conveyed from the impression cylinder of the last printing station of the press toward the sheet delivery stacker by utilizing a delivery cylinder mounted to the existing press delivery drive shaft to perform the dual function of a coating material applicator roller and a sheet delivery cylinder so that no modification of the press is required to enable the press to be used for either coating or noncoating operation, and without impairment of any normal press operations.

More specifically, the present invention is intended for use in a sheet-fed, offset rotary printing press of the type having at least one printing station which includes a blanket cylinder and an impression cylinder disposed for printing ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets off the impression cylinder and transporting the sheets toward the press sheet delivery stacker. For use of the present invention, the press must include a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder, and which is driven in timed synchronous relation with the impression cylinder.

In accordance with the invention, a delivery cylinder is mounted to the delivery drive shaft and provided with a coating blanket disposed over the peripheral outer surface of the cylinder, and adapted to engage and support the wet ink side of a freshly printed sheet. A coating apparatus including a supply of liquid coating material and a pick-up roller disposed to receive coating material from the supply, is mounted to the press and operable to permit the pick-up roller to be moved into engagement with the delivery cylinder so that coating material on the pick-up roller is transferred to the coating blanket of the delivery cylinder and then to the freshly printed sheet.

Preferably, the coating apparatus is mounted to the press downstream of the delivery drive shaft, and includes means to selectively move the pick-up roller into and out of engagement with the delivery cylinder. When the pick-up roller is not in the operable position in engagement with the delivery cylinder, the delivery cylinder can be used for conventional noncoating sheet delivery by removing the coating blanket and, preferably, replacing the coating blanket with a fabric net such as of the net type cylinder system previously described. To convert to a coating operation, the coating blanket is attached to the delivery cylinder and, depending upon the thickness of the sheets to be printed, packed with suitable packing sheets to increase the effective diameter of the cylinder so that pressure is applied to the freshly printed sheets against the impression cylinder by the coating blanket covered delivery cylinder. The pick-up roller is then moved to the operative position engaged with the delivery cylinder so that as freshly printed sheets are pulled by the delivery conveyor from the impression cylinder around the delivery cylinder, coating material applied to the delivery cylinder by the pick-up roller is transferred to the freshly printed sheets in the nip between the delivery cylinder and the impression cylinder.

Since the delivery cylinder is driven by the delivery drive shaft in precise timed relation with the impression cylinder, exact registration between the application of coating material and the printed sheet is assured. Further, since the coating of the freshly printed sheets is carried out through use of a delivery cylinder mounted to the existing press delivery drive shaft, no substantial press modifications are required, and the press can be quickly and easily converted between coating and noncoating operation with no loss of printing capability of the final printing station.

Many other features and advantages of the present invention will become more apparent from the following detailed description take in conjunction with the accompanying drawings which disclose, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevational view of a sheet-fed, offset rotary printing press having a coating apparatus embodying the present invention;

FIG. 2 is an enlarged fragmentary side elevational view taken substantially within the circular area designated "2" in FIG. 1 and showing the coating apparatus of the present invention during coating operation;

FIG. 3 is a side elevational view similar to FIG. 2, but showing the coating apparatus in the inoperative posi-

tion with the coating pick-up roller and reservoir removed, and the blanket covering over the delivery cylinder replaced with a fabric net for non-coating printing;

FIG. 4 is an enlarged fragmentary perspective view showing one side of the coating apparatus mounted in the press and illustrating the fluid path of coating material from a supply tank to the reservoir of the coating unit;

FIG. 5 is an enlarged fragmentary perspective view illustrating the end mounting of the coating pick-up roller to its support bracket; and

FIG. 6 is an enlarged fragmentary sectional view taken substantially along the lines 6—6 of FIG. 4.

DETAILED DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENT

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line apparatus, herein generally designated 10, for selective use in applying a protective and/or decorative coating to the freshly printed surface of sheets printed in a sheet-fed, offset rotary printing press, herein generally designated 12. In this instance, as shown in FIG. 1, the coating apparatus 10 is illustrated as installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation "Heidelberg Speedmaster 102V (40")," and which includes a press frame 14 coupled at one end, herein the right end, with a sheet feeder 16 from which sheets, herein designated 18, are individually and sequentially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the finally printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical sheet printing stations 22, 24, 26 and 28 which can print different color inks onto the sheets as they are moved through the press 10.

As illustrated, each of the printing stations 22, 24, 26 and 28 is substantially identical and of conventional design, herein including a sheet feed cylinder 30, a plate cylinder 32, a blanket cylinder 34 and an impression cylinder 36, with each of the first three printing stations 22, 24, and 26 having a transfer cylinder 38 disposed to withdraw the freshly printed sheets from the adjacent impression cylinder and transfer the freshly printed sheets to the next printing station via a transfer drum 40. The final printing station 28 herein is shown as equipped with a delivery cylinder 42 which functions to support the printed sheet 18 as it is moved from the final impression cylinder 36 by a delivery conveyor system, generally designated 44, to the sheet delivery stacker 20.

The delivery conveyor system 44 herein is of conventional design and includes a pair of endless delivery gripper chains 46, only one of which is shown in the drawings, carrying at regular spaced locations along the chains, laterally disposed gripper bars 48 having gripper elements 50 used to grip the leading edge of a sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing station 28. As the leading edge of the sheet 18 is gripped by the grippers 50, the delivery chains 46 pull the sheet away from the impression cylinder 36 and convey the freshly printed sheet to the sheet delivery stacker 20 where the grippers release the finally printed sheet. The endless delivery chains 46 are driven in synchronous timed relation to the impression cylinder 36 by sprocket wheels 52 fixed adjacent the lateral ends of a delivery drive shaft 54 which has a mechanically geared coupling (not shown) through the press drive system to the impression cylinder. The delivery drive shaft 54 extends laterally between the sides of the press frame 14 adjacent the impression cylinder 36 of the last printing station 28, and is disposed to be parallel with the axis of the impression cylinder. In this instance, the delivery cylinder 42, which is constructed to allow adjustments in diameter by suitable means, is fixedly mounted to the delivery drive shaft 54 so that the delivery cylinder is also rotated in precise timed relation to the impression cylinder.

Preferably, each of the transfer cylinders 38 is equipped with an anti-marking system such as the aforementioned net type transfer cylinder system or the press 12 can be supplied in the transfer positions with vacuum transfer systems of the type disclosed in the above-identified copending U.S. application Ser. No. 07/630,308 filed Dec. 18, 1990, although as will become more apparent hereinafter, the use of such transfer systems is not required for the present invention and other types of transfer systems can be used. For reasons that will become more apparent hereinafter, for most effective use of the present invention, however, the delivery cylinder 42 should be of the type which employs the "SUPER BLUE" delivery cylinder system, or, as an alternative, should employ in the delivery position, a vacuum transfer system such as disclosed in the above-identified copending U.S. application Ser. No. 07/630,308.

In this respect, it is important to note that when the freshly printed sheets 18 are conveyed away from the impression cylinder 36 of the final printing station 28 by the gripper 50 carried by the delivery chains 46, the wet inked surfaces of the sheets face the delivery drive shaft 54 and the sheets must be supported such that the ink is not marked or smeared as the sheets are transferred. Typically, such support is provided by skeleton wheels or cylinders mounted to the press delivery drive shaft 54, or as is now more commonly used, net type delivery cylinders such as of the "SUPER BLUE" delivery cylinder system type disclosed in the aforementioned DeMoore patent. More recently, vacuum transfer apparatus of the type disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308 have been used in place of delivery cylinders or skeleton wheels to pull the unprinted side of the sheet away from the delivery drive shaft 54 so that the wet ink surface of the sheets do not come into contact with any press apparatus. It has been found, however, that when a protective or decorative coating material is applied to the wet ink surface of the sheets, the coating protects the wet ink against marking and smearing such that the coating applicator roller itself can be used to support the wet inked surface of the sheets without fear of damage to the freshly printed surface.

In accordance with the present invention, the in-line coating apparatus 10 for selectively applying the protective or decorative coating to the sheets 18 enables the press 12 to be operated in the normal manner without the loss of the final printing station 28, and without requiring any substantial press modifications by employing the existing press delivery drive shaft 54 as the mounting location for the coating applicator roller. In presses 12 utilizing a net type delivery cylinder system, that system can be quickly and easily converted to perform the dual function of being a coating applicator roller and a delivery cylinder. In presses having other

types of delivery systems such as skeleton wheels mounted on the delivery drive shaft 54 or a vacuum transfer apparatus as disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308, conversion to a coating operation can be quickly and easily achieved by mounting on the press delivery drive shaft in place of the skeleton wheels or in addition to the vacuum transfer apparatus, a suitable support cylinder capable of performing the combined function of a coating applicator roller and a delivery cylinder 42. Typically, such a support cylinder will have a diameter which provides no more than about a 0.090 inch clearance between the cylinder support surface and the adjacent impression cylinder 36. By utilizing the delivery cylinder 42 mounted on the delivery drive shaft 54 to also act as a coating applicator roller, the present invention insures that the coating will be applied to the printed sheet 18 in precise timed registration, and will permit the press to be operated with its full range of printing stations, yet allow fast, simple and convenient change-over from coating to noncoating operations, and vice versa, with a minimum of press down time.

Toward these ends, the coating apparatus 10 of the present invention includes a relatively simple, positive acting and economical coating unit, generally designated 60, mounted to the press frame 14 down stream of the delivery drive shaft 54 and positioned to selectively supply coating material to the support surface of a delivery cylinder 42 mounted on the delivery drive shaft. As best can be seen in FIGS. 2, 4 and 6, the coating unit 60 herein comprises a pair of side frames 62, only one of which is shown, it being understood that the other side frame is substantially the same as that of the side frame illustrated, attached to each side of the press frame 14. Pivotally mounted to one end of each of the side frames 62 is a support bracket 64 carrying one end of a coating material reservoir 66 and cooperating coating material pick-up roller 68 each disposed to extend laterally across the press 12 parallel with the delivery drive shaft 54. The coating unit 60 is mounted between the upper and lower runs of the delivery chains 46 down stream of the delivery drive shaft 54, and positioned so that the outer peripheral surface 70 of the pick-up roller 68 can be frictionally engaged with the support surface of a delivery cylinder 42 mounted on the delivery drive shaft.

As best seen in FIGS. 2 through 4, the support bracket 64 is pivotally attached to the end of the side frame 62 by a shaft 72 disposed at the lower end portion of the bracket, and can be pivoted about the shaft by an extensible cylinder 74, herein shown as a hydraulic cylinder, one end 76 of which is secured such as by welding to the side frame, and the opposite end 78 of which is coupled through a pivot shaft 79 to the upper end portion of the bracket. By extending or retracting the cylinder 74, the extent of frictional engagement of the pick-up roller 68 with the surface of the delivery cylinder 42 can be controlled, and the pick-up roller can be completely disengaged from the delivery cylinder.

The coating pick-up roller 68, which can be of conventional design and preferably one such as the Anilox rollers manufactured by A.R.C. International of Charlotte, N.C., and sold under the name "PRINTMASTER" having an engraved ceramic or chrome outer peripheral surface 70, is designed to pick up a predetermined uniform thickness of coating material from the reservoir 66, and then uniformly transfer the coating to the support surface of the delivery cylinder 42. To effect rotation of the pick-up roller 68, a suitable motor 80, herein a hydraulic motor, is attached to one of the side frames 62 and coupled to a suitable hydraulic fluid source (not shown) through fittings 81. Attached to the output of the motor 80 is an output gear which is drivingly coupled through a reduction gear 81 and a series of idler gears 82 each mounted on stub axles 84, to a drive gear 86 attached to the end of a shaft 88 on which the pick-up roller 68 is concentrically mounted. The shaft 88 of the pick-up roller 68 is, in turn, journaled at each end to the brackets 64 through a releasable semicircular collar 90 (see FIG. 5) attached by bolts 92 to the bracket. Herein, the axle of the terminal idler gear, designated 82', also serves as the shaft 72 for pivotally mounting the support bracket 64 to the side frame 62 so that when the bracket is rotated about the shaft, the terminal idler gear remains engaged with the drive gear 86 of the pick-up roller 68.

In this instance, as best as can be seen in FIG. 6, the pick-up roller 68 has a portion which projects laterally into the reservoir 66 containing the supply of coating material, and a pair of upper and lower inclined doctor blades 94 and 96 attached to the reservoir engage the roller surface to meter the coating material picked up from the reservoir by the etched surface 70 of the roller. The reservoir 66 herein is formed by an elongated, generally rectangular housing 98 having a generally C-shaped cross-section with a laterally extending opening 100 along one side facing the pick-up roller 68, and is supplied with coating material from a supply tank 102 disposed in a remote location within or near the press 12. Preferably, the reservoir 66 is removably attached to the brackets 64, herein by bolts 104 having enlarged, knurled heads 106, and which can be threaded through slots 108 formed in the brackets to clamp the reservoir in place on the brackets.

To insure that an adequate supply of coating material is always present within the reservoir 66 and to prevent coagulation and clogging of the doctor blades 94 and 96 by the aqueous coating material, the coating material is circulated through the reservoir, herein by two substantially identical pumps 110 and 112, one of which pumps coating material from the supply tank 102 via a supply line 114 to the bottom of the reservoir, and the other of which acts to provide suction to a pair of return lines 116 coupled adjacent the top of the reservoir for withdrawing unused coating material from the reservoir. By circulating the coating material from the supply tank 102 at a greater rate than the rate of withdrawal of material by the pick-up roller 68, a substantially constant supply of coating material will always be present within the reservoir 66.

In this instance, the general arrangement of the pick-up roller 68, doctor blades 94 and 96, and reservoir 66 is substantially like that disclosed in U.S. Pat. No. 4,821,672 entitled DOCTOR BLADE ASSEMBLY WITH ROTARY END SEALS AND INTERCHANGEABLE HEADS", the disclosure of which can be reviewed for details concerning the structure and operation of a pick-up roller and reservoir usable with the present invention.

Once the coating unit 60 has been installed in a press 12, which basically only requires that the side frames 62 be attached, such as with bolts, to the sides of the press frame 14, and the hydraulic motor 80 be coupled with a suitable hydraulic source, the press can be quickly and easily converted to the coating mode. In presses 12 already supplied with a net type delivery cylinder sys-

tem, to convert to a coating operation, all that is necessary is that the fabric net material (designated 122 in FIG. 3) normally used over the support surface of the net type delivery cylinder during noncoating press operations, be removed and replaced with a coating blanket 124 capable of transferring coating material deposited thereon onto the printed sheets. Typically, such a blanket 124 can be formed as a rubber covering such as used for the covering surface of the conventional blanket cylinders 34 of the press 12. In presses 12 having conventional skeleton wheels or a vacuum transfer type apparatus such as that of the aforementioned copending U.S. application Ser. No. 07/630,308, a suitable delivery cylinder 42 can be fixed to the delivery drive shaft 54 and a similar coating blanket 124 applied thereto over the cylinder surface.

It is important to note that during nonprinting operations, the net type delivery cylinder 42 does not engage the surface of the impression cylinder 36 during sheet delivery. However, when used as a coating applicator roller during coating operations, the effective diameter of the delivery cylinder 42 must be increased so that the coating blanket 124 presses the sheet 18 against the surface of the impression cylinder 36, as shown in FIG. 2. To increase the effective diameter of the delivery cylinder 42, the thickness of the coating blanket 124 applied over the support surface of the delivery cylinder 42 can be selected to correspond with the thickness of the sheets 18 to be printed, or suitable packing sheets, such as paper sheets (not shown) of the type conventionally used in conjunction with press blanket cylinders 34, can be interposed between the delivery cylinder and the coating blanket.

While any suitable means can be used to attached the coating blanket 124 to the support surface of the delivery cylinder 42, in this instance, as shown in FIGS. 2 and 3, the delivery cylinder is supplied with clamps 126 attached by bolts 127 to the cylinder adjacent the leading edge 130 to secure the leading edge of the coating blanket 124 to the cylinder, and adjustable tensioning clamps 128 are provided adjacent the cylinder trailing edge 132 for securing the trailing edge of the blanket to the cylinder. However, the tensioning claims 128 are pivotally mounted at one end by a pin 129 to the cylinder 42, and the blanket tension is adjusted through a bolt 131 and nut 133 arrangement. Depending upon the thickness of the sheets 18 to be printed and coated by the press 12, one or more layers of packing paper or the like may be interposed between the support surface of the delivery cylinder 42 and the coating blanket 124 to increase the effective diameter of the cylinder. Provision of the tensioning clamps 128 for attaching the coating blanket 124 to the leading edge 132 of the delivery cylinder 42 allows for such control and adjustment.

Once installed, the coating unit 60 can remain in position even though the press 12 is operated in the non-coating mode. In this respect, when the coating unit 60 is not in operation, the extensible cylinder 74 can be actuated to pivot the support brackets 64 carrying the pick-up roller 68 and reservoir 66 about the shaft 72 and away from the delivery cylinder 42, thus rendering the coating unit inoperative. This then also frees the pick-up roller 68 and reservoir 66 for fast and easy removal from the coating unit 60 for cleaning, service or replacement. To remove the pick-up roller 68, the coating material is drained from the reservoir 66, and the pressure exerted by the doctor blades 94 and 96 against the roller is released, therein through operation of a pressure adjustment screw 120 attached to the reservoir, and the bolts 92 and collars 90 are removed, thereby permitting the pick-up roller to be lifted from the coating unit 60. To remove the reservoir 66, all that need be done is to release the mounting bolts 104 securing the reservoir to the brackets 64. With the coating unit 60 moved by the extensible cylinder 74 to the inoperative position, the delivery cylinder 42 can be converted for normal delivery cylinder operation simply by removing the coating blanket 124 from the delivery cylinder 42 and replacing the blanket with a fabric net 122. Alternatively, if a vacuum transfer apparatus such as described in the aforementioned copending U.S. application Ser. No. 07/630,308 is installed in the press 12, that apparatus can be activated to deliver sheets from the impression cylinder 36 without effecting any delivery cylinder change since the freshly printed side of the sheets will not come into contact with the delivery cylinder.

In a typical noncoating operation of the press 12 with the coating apparatus 10 installed, the coating unit 60 will be in the inoperative position. In that situation and with a net type delivery cylinder 42 installed, the delivery cylinder will be covered with the fabric net 122 so that the delivery cylinder operates in the normal manner with the wet ink side of the freshly printed sheets 18 being supported by the net covered surface of the delivery cylinder. Should the press 12 include a vacuum transfer apparatus such as disclosed in the aforementioned copending U.S. application Ser. No. 07/630,308, the delivery cylinder 42 can remain on the delivery drive shaft 54, with or without a fabric net 122, depending upon whether or not the press is used for perfector printing.

When it is desired to convert to the coating mode of operation, the press 12 is stopped just long enough to replace the fabric net 122 on the delivery cylinder 42 with the coating blanket 124 packed to the required extent necessary for providing the proper pressure to effect coating of the sheet thickness to be printed. Thereafter, the pumps 110 and 112 are activated and the press 12 re-started. The extensible cylinder 74 can then be activated to control the pressure of the pick-up roller 68 against the delivery cylinder 42 to obtain the desired application of coating material to the freshly printed sheets 18.

Notably, with the coating apparatus 10 of the present invention, no timing adjustments between the delivery cylinder 42 and the impression cylinder 36 are required to achieve and maintain precise registration between application of the coating material and the printed surface of the sheets 18. Further, the coating unit 60 permits a wide range of coating weights to be applied to the printed sheets 18 by quickly and easily changing pick-up rollers 68 from those designed to produce a very light coating application to those designed to produce a very thick coating application can be used.

From the foregoing, it should be apparent that the coating apparatus 10 of the present invention provides a highly reliable, effective and economical in-line apparatus for selectively applying coating material to the freshly printed sheets 18 in a sheet-fed, offset rotary printing press 12 which allows the final printing station to continue to be used as a print station, yet which does not require any substantial press modification or the addition of a separate timed applicator roller. While a particular form of the present invention has been illustrated and described, it should be apparent that varia-

tions and modifications therein can be made without departing from the spirit and scope of the invention.

We claim:

1. In a sheet-fed, offset rotary printing press of the type including at least one printing station having a blanket cylinder and an impression cylinder disposed for printing ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery conveyor system including a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder and driven in timed synchronous relation with the impression cylinder, the improvement comprising:

- a delivery cylinder mounted to said delivery drive shaft and having an outer peripheral support surface adapted to engage and support a sheet being transported by said delivery conveyor system;
- a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape, and means for applying a coating of liquid coating material from said supply onto said outer peripheral surface of said pick-up roller; and
- means for mounting said coating apparatus to the press adjacent said delivery cylinder including selectively operable means for moving said pick-up roller between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said support surface of said delivery cylinder, and a second inoperable position with said peripheral surface out of engagement with said support surface of said delivery cylinder, whereby when said pick-up roller is in said first operable position, liquid coating material from said supply applied onto said peripheral surface of said pick-up roller is transferred to said support surface of said delivery cylinder and to said freshly printed sheet.

2. The improvement as set forth in claim 1 wherein said delivery cylinder includes a coating blanket disposed over said peripheral support surface.

3. The improvement as set forth in claim 1 wherein said delivery cylinder includes a removable coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position.

4. The improvement as set forth in claim 3 wherein said coating blanket has a rubber outer surface.

5. The improvement as set forth in claim 3 wherein said delivery cylinder includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

6. The improvement as set forth in claim 1 wherein said coating apparatus includes an elongated reservoir containing said supply of liquid coating material, said reservoir being disposed to extend parallel with said pick-up roller with a portion of said peripheral surface extending into said reservoir in contact with liquid coating material contained therein, and at least one doctor blade attached to said reservoir and engaging said peripheral surface, said doctor blade acting to limit the amount of liquid coating material applied onto said peripheral surface from said reservoir.

7. The improvement as set forth in claim 6 wherein said reservoir and said pick-up roller are movably coupled to said press and said selectively operable means includes an extensible cylinder coupled between said reservoir and said press and operable to move said reservoir and said pick-up roller between said first and second positions.

8. The improvement as set forth in claim 7 wherein said pick-up roller is rotatably driven by a motor attached to said coating apparatus.

9. The improvement as set forth in claim 8 wherein said delivery cylinder includes a rubber coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position, and includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

10. The improvement as set forth in claim 9 wherein said coating apparatus is mounted to said press downstream of said delivery drive shaft in the direction of travel of said sheets during transport by said delivery conveyor system.

11. The improvement as set forth in claim 1 wherein said mounting means includes first and second side frames mounted on said press, a support shaft mounted on and extending between said first and second side frames, a support bracket attached to said coating apparatus and movably coupled to said support shaft for pivotal movement between said first and second positions, and said selectively operable means includes an extensible cylinder coupled between said coating apparatus and said support bracket and operable to move said coating apparatus toward and away from said delivery cylinder.

12. In a sheet-fed, offset rotary printing press of the type including at least one printing station having a blanket cylinder and an impression cylinder disposed for printing wet ink onto sheets passing therebetween, and a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery conveyor system comprising a pair of endless gripper chains disposed on opposite sides of the press and supporting therebetween gripper bars and grippers spaced along the chains, the gripper chains being driven in timed synchronous relation with the impression cylinder by laterally spaced sprocket wheels mounted on opposite ends of a delivery drive shaft disposed adjacent to and extending parallel with the impression cylinder, the improvement comprising:

- a delivery cylinder mounted to said delivery drive shaft between said sprocket wheels and having an outer peripheral support surface covered by a removable coating blanket adapted to engage and support the wet ink side of a sheet being transported by said gripper bars;
- a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape communicating with said supply, and means for applying liquid coating material from said supply onto said peripheral surface of said pick-up roller; and,
- means for mounting said coating apparatus to the press adjacent the delivery cylinder, said means including selectively operable means for moving said coating apparatus between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said delivery cylinder, and a second inoperable position with said peripheral surface of said pick-up roller out of engagement with said delivery cylinder, whereby when said coating apparatus is in said first operable

position, liquid coating material from said supply metered onto said peripheral surface of said pick-up roller is transferred to said delivery cylinder and to said freshly printed sheet, and when said coating apparatus is in said second inoperable position, said delivery cylinder is disposed for non-coating sheet delivery operation.

13. The improvement as set forth in claim 12 wherein the effective diameter of said delivery cylinder covered by said coating blanket is sufficient to apply pressure to sheets against said impression cylinder as said sheets are pulled from said impression cylinder by said gripper bars.

14. The improvement as set forth in claim 13 wherein said coating blanket has a rubber outer support surface.

15. The improvement as set forth in claim 14 wherein said coating apparatus is disposed downstream of said delivery drive shaft in the direction of travel of said sheets during transport by said delivery conveyor system.

16. A sheet-fed, offset rotary printing press including:

at least one printing station having a blanket cylinder and an impression cylinder disposed for printing wet ink onto sheets passing therebetween;

a delivery conveyor system for pulling freshly printed sheets from the impression cylinder and transporting the printed sheets toward a sheet delivery stacker, the delivery system including a delivery drive shaft;

a delivery cylinder mounted to said delivery drive shaft and having an outer peripheral support surface adapted to engage and support a sheet being transported by said delivery conveyor system;

a coating apparatus including a supply of liquid coating material, a rotatable pick-up roller having an outer peripheral surface of substantially cylindrical shape communicating with said supply, and means for applying liquid coating material from said supply onto said peripheral surface of said pick-up roller; and

means for mounting said coating apparatus to the press adjacent said delivery cylinder, said means including selectively operable means for moving said pick-up roller between a first operable position with a portion of said peripheral surface of said pick-up roller engaged with said delivery cylinder, and a second inoperable position with said peripheral surface of said pick-up roller out of engagement with said delivery cylinder, whereby when said pick-up roller is in said first operable position, liquid coating material from said supply applied to said peripheral surface of said pick-up roller is transferred to said delivery cylinder and then to said freshly printed sheet.

17. A sheet-fed, offset rotary printing press as set forth in claim 16 wherein said delivery cylinder includes a removable coating blanket disposed over said peripheral support surface when said pick-up roller is in said first operable position.

18. A sheet-fed, offset rotary printing press as set forth in claim 17 wherein said coating blanket has a rubber outer surface.

19. A sheet-fed, offset rotary printing press as set forth in claim 17 wherein said delivery cylinder includes a fabric net disposed over said peripheral support surface when said pick-up roller is in said second inoperable position.

20. A sheet-fed, offset rotary printing press as set forth in claim 19 wherein said coating apparatus includes an elongated reservoir containing said supply of liquid coating material, said reservoir being disposed to extend parallel with said pick-up roller with a portion of said peripheral surface extending into said reservoir in contact with liquid coating material contained therein, and at least one doctor blade attached to said reservoir and engaging said peripheral surface, said doctor blade acting to limit the amount of liquid coating material applied onto said peripheral surface from said reservoir.

21. A sheet-fed, offset rotary printing press as set forth in claim 20 wherein said selectively operable means includes an extensible cylinder coupled between said reservoir and said press and operable to move said reservoir and said pick-up roller laterally between said first and second positions.

22. A sheet-fed, offset rotary printing press as set forth in claim 21 wherein said pick-up roller is rotatably driven by a motor attached to said coating apparatus.

* * * * *

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) Offenlegungsschrift

(11) DE 3046257 A1

(51) Int. Cl. 3: B 41 F 23/00

B 41 F 31/00

B 05 C 1/08

(21) Aktenzeichen: P 30 46 257.8 27

(22) Anmeldetag: 8. 12. 80

(43) Offenlegungstag: 9. 6. 82

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Prüfungsantrag gem. § 44 PatG ist gestellt

(54) **Lackiereinrichtung an Druckmaschinen**

DE 3046257 A1

3046257

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Lackiereinrichtung an Druckmaschinen

Patentansprüche

1.) Lackiereinrichtung an Druckmaschinen mit einem Lackvorratsbehälter und einer in diesen eintauchenden Schöpfwalze, wobei die von der Schöpfwalze aufgenommene Lackmenge durch eine Dosierwalze dosiert einer Reibwalze und Auftragwalze zugeführt wird, d a d u r c h g e k e n n z e i c h n e t, daß in Drehrichtung der Schöpfwalze (2) gesehen vor der Kontaktstelle der Dosierwalze (3) mindestens zwei an die Schöpfwalze (2) anstellbare Rakelwalzen (7) vorgesehen sind, durch welche je nach deren Stellung eine formatbezogene Lackführung auf der Schöpfwalze (2) einstellbar ist, daß an die mit der Schöpfwalze (2) in Kontakt stehende Dosierwalze (3) eine Rakel (6) anstellbar ist, durch welche die sich auf der Dosierwalze (3) befindliche Lackmenge abrakelbar und dem Lackvorratsbehälter (1) zuführbar ist.

2.) Vorrichtung nach Anspruch 1, d a d u r c h g e k e n n z e i c h n e t, daß die formatbezogene Lackführung durch Schrägstellen der Rakelwalzen (7) erzielbar ist, wobei die Rakelwalzen (7) auf Tragarmen (8) gelagert sind, an denen

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Stellmittel (9.1) angreifen.

3.) Vorrichtung nach Anspruch 1,
d a d u r c h g e k e n n z e i c h n e t,
daß sich die an die Dosierwalze (3) anstellbare Rakel (6) über die gesamte Länge der Dosierwalze (3) erstreckt.

4.) Vorrichtung nach Anspruch 1 und 2,
d a d u r c h g e k e n n z e i c h n e t,
daß die Rakelwalzen (7) in Achsrichtung der Schöpfwalze (2) verschiebbar angeordnet sind.

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Die Erfindung betrifft eine Lackiereinrichtung an Druckmaschinen mit einem Lackvorratsbehälter und einer in diesen eintauchenden Schöpfwalze, wobei die von der Schöpfwalze aufgenommene Lackmenge durch eine Dosierwalze dosiert einer Reibwalze und Auftragwalze zugeführt wird.

Für das Lackieren von Druckbogen in einem Maschinendurchgang hat es sich bewährt, das letzte Druckwerk als Lackierwerk einzusetzen. Wenn zum Lackieren ein sogenannter Wasserkastenlack verwendet wird, läßt sich das Lackieren ohne Zusatzeinrichtung mit dem Feuchtwerk vornehmen. Der Lack wird dann, wie das Feuchtmittel, dosiert vom Feuchtwerk der Druckplatte zugeführt.

Eine Vorrichtung zum Zuführen einer Flüssigkeit in einer Druckmaschine zeigt die US-PS 3 552 311. Bei dieser Vorrichtung geschieht das Dosieren durch das Schrägstellen einer Walze, wobei je nach Stellung der Walze eine mehr oder weniger breite feuchtmittellose Zone entsteht.

Der Nachteil dieser Vorrichtung liegt insbesondere darin, daß ein dosiertes Aufbringen von Lack auf die Druckplatte nicht möglich ist. Ebenso ist es nicht möglich formatbezogen Lack aufzubringen.

Der Erfindung liegt deshalb die Aufgabe zugrunde, eine Lackiereinrichtung zu schaffen, mit der es möglich ist, den Lack fein dosiert und formatbezogen auf einen Lackzylinder aufzubringen.

Gelöst wird diese Aufgabe durch die Merkmale im kennzeichnenden Teil von Patentanspruch 1.

Das besonders vorteilhafte Zusammenwirken der vorgeschlagenen Maßnahmen besteht darin, daß zunächst die Lackführung durch die Rakelwalzen auf das Bogenformat bzw. das Sujet einstellbar ist, daß dann die eigentliche Mengendosierung erfolgt, wobei diese Dosierung ohne Beeinträchtigung der lackfreien Stellen dadurch ermöglicht ist, daß die Dosierwalze vorher von Lack frei gerakelt ist.

In besonderer Ausgestaltung der Erfindung können über die Breite der Lackiereinrichtung gesehen mehrere schrägstellbare Rakelwalzen vorgesehen sein. Hierdurch ergibt sich ein weiterer Vorteil, nämlich der, daß nicht nur formatbezogen, sondern auch sujetbezogen Lack aufgetragen werden kann.

Eine Ausgestaltungsvariante der Erfindung ist nachfolgend anhand einer Skizze näher erläutert.

Es zeigt: Fig. 1 eine Seitenansicht der Lackiereinrichtung teilweise im Schnitt.

Fig. 2 eine Ansicht der Lackiereinrichtung entsprechend Fig. 1.

Die Lackiereinrichtung entspricht in der Walzenanordnung einer bekannten kontinuierlich arbeitenden Feuchteinrichtung mit einer Schöpfwalze 2, welche in einen Lackvorratsbehälter 1 eintaucht, einer an die Schöpfwalze 2 anstellbaren Dosierwalze 3, einer Reibwalze 4 und einer Auftragwalze 5, die an einen Lackierzylinder 10 anliegt.

Weiterhin sind an die Schöpfwalze 2 anstellbare Rakelwalzen 7 vorgesehen, mit denen ein formatbezogenes Dosieren des Lackes ermöglicht wird. Eine sich über die Länge der Dosierwalze 3 erstreckende Rakel 6 ist an die Dosierwalze 3 anstellbar vorgesehen und kann über Stellmittel 9.2 betätigt werden.

Die Dosierung der Lackmenge erfolgt nach zwei Gesichtspunkten:

1.) die Lackmenge für den Lacküberzug (Schichtdicke),

2.) die formatbezogene Dosierung der Lackmenge.

Die Dosierung der Lackmenge für den Lacküberzug erfolgt durch die an die Schöpfwalze 2 anstellbare Dosierwalze 3. Um Rückwirkungen auf die Dosierung zu vermeiden, wird die nach der Spaltstelle Schöpf- 2 und Dosierwalze 3 auf der Dosierwalze 3 befindliche Lackmenge durch die Rakel 6 abgerakelt und dem Lackvorratsbehälter 1 über einen Rückführkanal 11 zugeführt. Dieses Abrakeln ermöglicht es, daß immer die gleiche Menge frischen Lackes zur Reibwalze 4 und damit zur Auftragwalze 5 gelangt.

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Das formatbezogene Dosieren des Lacks geschieht durch mindestens zwei an die Schöpfwalze 2 anstellbare Rakelwalzen 7, die so befestigt sind, daß diese gegenüber der Schöpfwalze 2 schrägstellbar sind. Hierdurch ist es möglich, die Lackführung so vorzunehmen, daß nur ein Teilbereich der Schöpfwalze 2 Lack führt. Durch die Verwendung von mehr als zwei Rakelwalzen 7 ist es auch möglich sujetbezogen Lack zu führen.

Damit bereits vor dem Dosieren der Lackmenge ein formatbezogenes Dosieren möglich ist, sind die Rakelwalzen 7 in Drehrichtung der Schöpfwalze 2 gesehen vor der Kontaktstelle Schöpfwalze 2 mit der Dosierwalze 3 angeordnet.

Zum Einstellen der Rakelwalzen 7 zur Schöpfwalze 2 sind die Rakelwalzen 7 auf Tragarmen 8 gelagert die gegenüber der Schöpfwalze 2 einstellbar sind. Die Betätigung der Tragarme 8 kann z.B. durch Stellmittel 9.1 erfolgen.

Um beim formatbezogenen Dosieren variabel zu sein, ist es vorteilhaft, die Tragarme 8 in Haltern 12 zu führen, die auf einer Traverse 13 verschiebbar befestigt sind.

Um den nachträglichen Anbau der für die Dosierung des Lackes erforderlichen Anbauten zu ermöglichen, ist die Traverse 13 in Tragarmen 14 befestigt, die an einer bereits vorhandenen Gestelltraverse 15 anschraubbar ist. Um einen leichteren und genau justierten Anbei der Tragarme 14 zu gewährleisten sind an der Gestelltraverse 15 Indexbolzen 16 vorgesehen.

Leerseite

Nummer: 3046257
Int. Cl.³: B 41 F 23/00
Anmeldetag: 8. Dezember 1980
Offenlegungstag: 9. Juni 1982

3046257

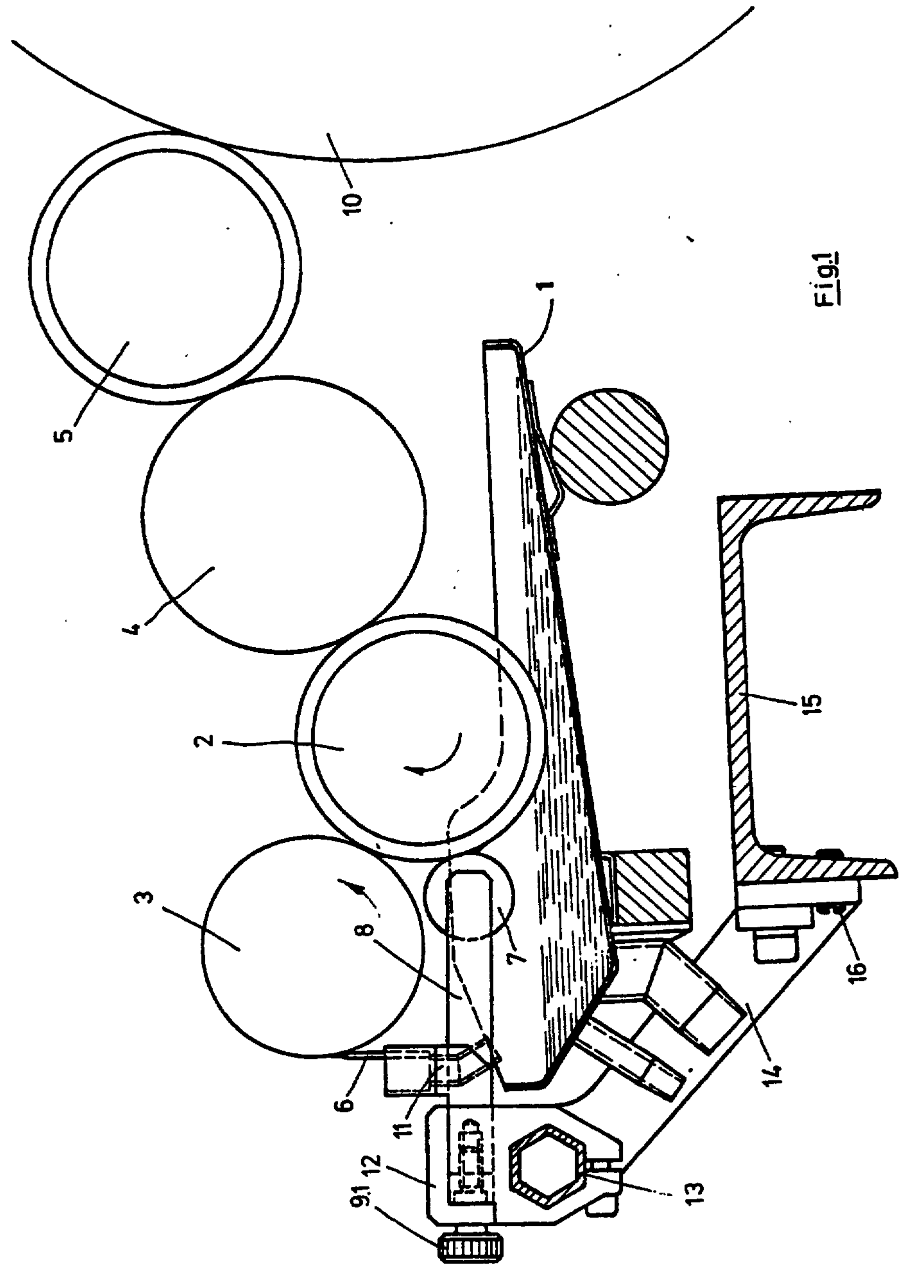

Fig.1

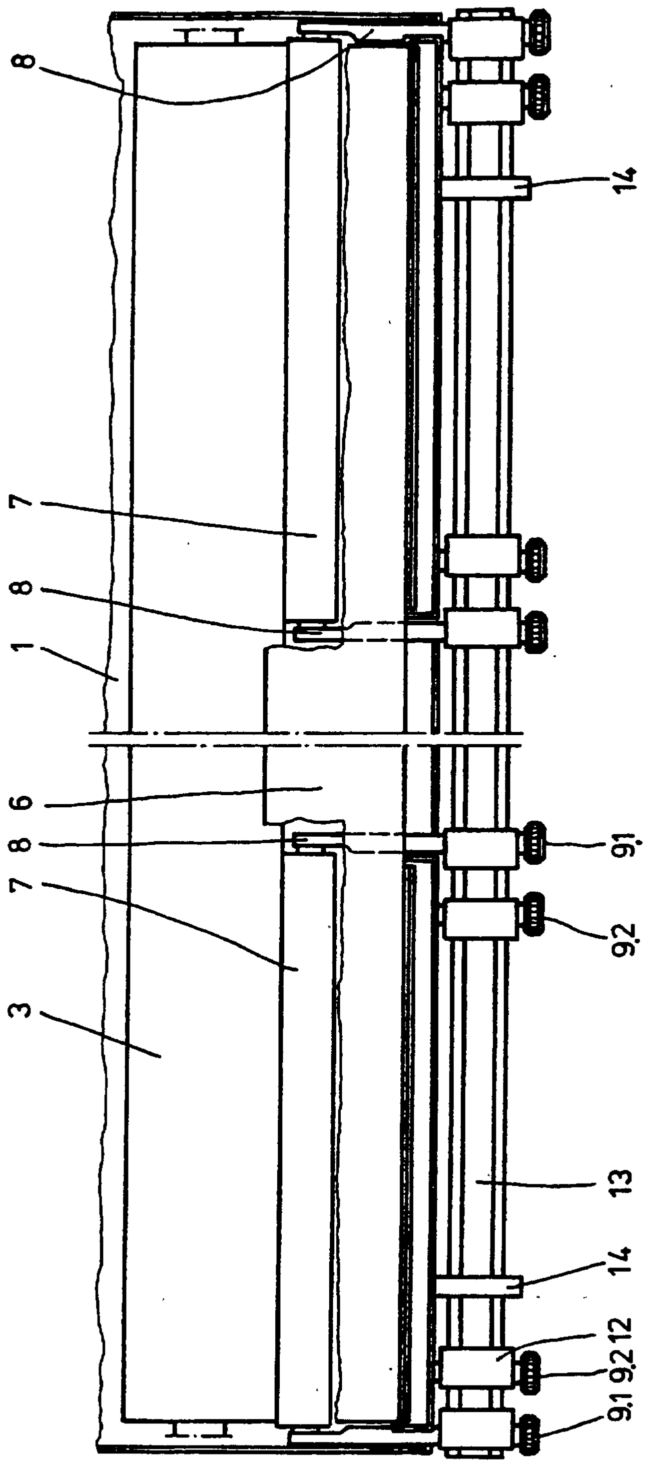

Fig. 2

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Patentschrift**

(10) **DE 39 41 571 C 2**

(51) Int. Cl.^{6}:
B 41 F 7/02
B 41 F 23/08

(21) Aktenzeichen: P 39 41 571.6-27
(22) Anmeldetag: 16. 12. 89
(43) Offenlegungstag: 28. 6. 90
(45) Veröffentlichungstag der Patenterteilung: 1. 6. 95

DE 39 41 571 C 2

Innerhalb von 3 Monaten nach Veröffentlichung der Erteilung kann Einspruch erhoben werden

(30) Unionspriorität: (32) (33) (31)
27.12.88 DD WP B 41 F/323897

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(56) Für die Beurteilung der Patentfähigkeit in Betracht gezogene Druckschriften:

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(54) Verfahren und Vorrichtung zum Verdrucken von Spezialfarben

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Beschreibung

Die Erfindung betrifft ein Verfahren und eine Vorrichtung zum Verdrucken von Spezialfarben gemäß dem Oberbegriff der Patentansprüche 1 und 4.

Im Offsetdruck sind in einigen Einsatzfällen bestimmte Qualitätserfordernisse verglichen zu anderen Druckverfahren nicht erreichbar. So werden z. B. Metalldruckfarben relativ schlecht verdruckt.

Die Ursache ist zum einen in der Verwendung des Wassers im Offsetdruck und die damit verbundene Oxidation der Metallpigmente zu suchen, zum anderen sind speziell im Metallfarbendruck die Lösungsmittelfarben im Vorteil, da durch weniger Bindemittel eine bessere Polarisation der Metallblättchen (ähnlich dem Bronzieren) möglich ist.

Zur Behebung dieses Mangels im Offsetdruck sind gegenwärtig Bestrebungen im Gange, den Bogentiefdruck in Kombination mit dem Bogenoffset zu bringen. Diesem Entwicklungstrend steht der Nachteil gegenüber, daß Tiefdruckwerke relativ aufwendig sind und bei der Verwendung von Tiefdruckplatten der Kanal mit Plast ausgefüllt werden muß, wodurch wiederum lange Rüstzeiten entstehen.

Es sind auch Bogenrotationsdruckmaschinen mit Lackierwerken zum Auftragen von Lack auf den Druckbogen bekannt (DD 2 43 007). Hinweise zur Verwendung des Lackierwerkes zum Drucken von Spezialfarben sind dieser Schrift nicht zu entnehmen.

Die Aufgabe der Erfindung besteht in der Schaffung eines Verfahrens und einer Vorrichtung zum Verdrukken von Spezialfarben nach dem Prozeßdruck in Bogenoffsetdruckmaschinen, bei denen mit relativ geringem Aufwand eine höhere Druckqualität erreichbar ist.

Erfindungsgemäß wird die Aufgabe durch die kennzeichnenden Merkmale der Patentansprüche 1 und 4 gelöst. Zweckmäßige Ausgestaltungen sind in den Unteransprüchen offenbart.

Nachfolgend wird das erfindungsgemäße Verfahren näher beschrieben.

Die Aufgabe nach dem Prozeßdruck, d. h. dem einoder mehrfarbigen Offsetdruck eine Spezialfarbe beispielsweise eine Bronzedruckfarbe auf den bedruckten Bogen aufzubringen war bisher infolge geeigneter Druckwerke nur in Form der sog. Maschinenbronzierung off-line oder in line mit Qualitätsabstrichen möglich.

Erfindungsgemäß wird nunmehr nicht das Offsetdruckwerk einer Druckmaschine zum Spezialfarbauftrag verwendet, sondern die Spezialfarbe wird direkt über eine Auftragseinrichtung in Form einer eingefärbten reliefartigen Druckform in Gestalt einer Flexodruckform oder Hochdruckform auf den Druckbogen übertragen. Insbesondere wird eine als Lackturm/ Lackierwerk ausgebildete Auftrageinrichtung zum Auftragen der Spezialfarbe, insbesondere der Metalldruckfarbe, verwendet. Der Lackturm bzw. das Lackierwerk ist dabei Bestandteil der Druckmaschine; er kann aber auch als der Druckmaschine nachgeschaltete selbständige Einheit ausgebildet sein. Dabei wird erfindungsgemäß die bisher nicht erkannte Ähnlichkeit im Aufbau von Lackier- und Flexodruckwerken und die Eignung eines Lackierwerkes für das Verdrucken von in üblichen Offset-Druckwerken nicht verdruckbaren Spezialfarben ausgenutzt.

Der Druckbogen kann dabei vor und/oder nach dem Aufdrucken der Spezialfarbe lackiert werden.

Des weiteren ist es möglich, den Druckbogen vor und/oder nach dem Aufdrucken der Spezialfarbe zu trocknen.

Die erfindungsgemäße Vorrichtung soll nachstehend an einem Ausführungsbeispiel näher erläutert werden.

In den Zeichnungen zeigen

Fig. 1 Bogenoffsetdruckmaschine,

Fig. 2 Bogenoffsetdruckmaschine mit Trockenwerk,

Fig. 3 Zweiwalzenzuführeinrichtung,

Fig. 4 Dreiwalzenzuführeinrichtung,

Fig. 5 Dreiwalzenzuführeinrichtung (Reversbetrieb),

Fig. 6 Zweiwalzenzuführeinrichtung mit Rakel (Reversbetrieb).

Bei der in Fig. 1 dargestellten Bogenoffsetdruckmaschine mit einer Druckeinrichtung 20 (die vorgeordneten Druckeinrichtungen sowie der Anleger sind nicht dargestellt), einer Auftrageinrichtung 8 und einem Auslagesystem 12 wird der zu bedruckende Bogen von einem ersten Bogenführungszylinder 1 an einen Druckzylinder 2 übergeben. In der Berührungszone zwischen dem Druckzylinder 2 und einem Gummizylinder 3 erfolgt der Druck.

Ein Plattenzylinder 5, der das Druckbild auf den Gummizylinder 3 überträgt, wird durch ein Farbwerk 6 eingefärbt. Die Feuchtung erfolgt durch ein Feuchtwerk 7.

Der Druckbogen wird dann dem zweiten Bogenführungszylinder 1.1 und von diesem einem Gegendruckzylinder 19 einer Auftrageinrichtung 8 übergeben.

Vom Gegendruckzylinder 19 wird der bedruckte Bogen dem Auslagesystem 12 übergeben, von dem er auf den Auslagestapel 13 abgelegt wird. Im Bereich der Bogenführung und Auslage sind zur Unterstützung der Trocknung der Druckfarbe auf dem Bogen zahlreiche Trockner 14 bzw. Blaseinrichtungen 15 angeordnet.

Der Gegendruckzylinder 19 ist Bestandteil einer einen Auftragzylinder 4 und eine mit demselben in Wirkverbindung stehende Zuführeinrichtung 22 enthaltenden Auftrageinrichtung 8. Die Auftrageinrichtung 8 fungiert üblicherweise als Lackierwerk zum Auftrag von Lack auf den zu veredelnden Druckbogen, wobei das Lackierwerk als Lackturm ausgebildet ist.

Erfindungsgemäß fungiert die Auftrageinrichtung 8 alternativ auch als Druckwerk zum Verdrucken von Spezialfarben, z. B. Metalldruckfarben mit einer auf dem Auftragzylinder 4 aufgespannten reliefartigen Druckform, beispielsweise einer Flexodruckform oder Hochdruckform. Dabei wird erfindungsgemäß die bisher nicht erkannte Ähnlichkeit im Aufbau von Lackier- und Flexodruckwerken und die Eignung eines Lackierwerkes für das Verdrucken von in üblichen Druckwerken nicht verdruckbaren Spezialfarben, wie Metalldruckfarben, ausgenutzt.

Die Zuführeinrichtung 22 besteht aus einer Tauchwalze 9 und einer Einfärbwalze 10.

Zur besseren Farbübertragung und Dosierung kann die Tauchwalze 9 und/oder die Einfärbwalze 10 eine Rasterung aufweisen.

Die Flexodruckform besteht aus Gummi oder Plast.

Im Mikrobereich ist die Druckform an der druckenden Oberfläche rauh, wodurch eine günstige Affinität zwischen Druckform und Druckfarbe erzielt wird, die eine geringe Viskosität aufweist. Die Auftrageinrichtung 8 ist dabei mit einer Abdeckhaube 11 mit Absaugung versehen.

Soll nun das Lackierwerk als Auftrageinrichtung 8 zum Verdrucken von Metallfarbe eingesetzt werden, sind nur geringfügige Veränderungen des Lackierwerkes notwendig, wobei keine Systemänderung vorge-

nommen zu werden braucht. Dieser Umrüstaufwand bezieht sich im wesentlichen auf den Austausch von:

— Lackkasten gegen Farbwanne,
— Lackumlaufsystem gegen Farbumlaufsystem,
— Steuerungsänderung entsprechend Druckwerk,
— eventuell Walzentausch (glatte Tauchwalze 9 gegen Rasterwalze),
— Anstellung eines Rakels 17 an Tauchwalze 9 entsprechend **Fig.** 6.

In den **Fig.** 3, 4, 5 und **Fig.** 6 sind vier verschiedene Zuführeinrichtungen 22 für Lack oder Spezialfarben dargestellt, wobei die unterschiedlichen Zuführeinrichtungen je nach durch den Druckauftrag bestimmten Erfordernissen verwendet werden können. **Fig.** 3 zeigt eine Zweiwalzenzuführeinrichtung für Vorwärtslauf. In der Ausführungsform entsprechend **Fig.** 4 (Dreiwalzenzuführeinrichtung für Vorwärtslauf) ist zur besseren Dosierung auf der Tauchwalze 9 eine Dosierwalze 16 angeordnet.

Zum Übertragen sehr dünner und damit fein dosierter Farb- bzw. Lackschichten, dienen die Ausführungsformen gemäß **Fig.** 5 und **Fig.** 6, den sogenannten Reversbetrieb (Tauchwalze 9 entgegengesetzt angetrieben) mit zwei bzw. drei Walzen. Als zusätzliche Dosierstelle ist entsprechend **Fig.** 5 wiederum eine Dosierwalze 16 und gemäß **Fig.** 6 ein Rakel 17 an die Tauchwalze 9 angestellt. Mit dem Einsatz des Lackierwerkes als Auftrageinrichtung 8 ergeben sich noch weitere verfahrenstechnisch vorteilhafte Kombinationsmöglichkeiten. Diese bestehen in der Nutzung des Feuchtwerkes 7 der letzten Druckeinrichtung der Bogenoffsetdruckmaschine als Lackierwerk zum Vorlackieren der Bogen bei abgestelltem Farbwerk 6 und Flexodruck in der nachfolgenden Auftrageinrichtung 8. Durch die Vorlackierung werden die Vorteile des Flexodruckes weiter ausgeschöpft, da ein Einsinken der niedrigviskosen Farbe in den Bedruckstoff vermieden wird. In diesem Fall ist es aber günstig, ein Trockenwerk 18 mit thermischem Trockner 14 gemäß **Fig.** 2 zwischen der letzten Druckeinrichtung und der Auftrageinrichtung 8 anzuordnen, natürlich mit entsprechender Absaugvorrichtung.

Das zusätzliche Trockenwerk 18 besteht dabei aus einem Trockenzylinder 21, welcher mittels des thermischen Trockners 14 mit Wärme beaufschlagt wird.

Des weiteren besteht nunmehr die Möglichkeit, der letzten Druckeinrichtung zwei Lacktürme nachzuordnen, wobei der erste als Lackierwerk und der zweite als Auftrageinrichtung 8 einsetzbar ist oder Einsatz des ersten Lackturmes als Auftrageinrichtung 8 mit anschließender Lackierung im zweiten Lackturm, wodurch eine Versiegelung der in der Farbe enthaltenen Pigmente zur Erhöhung des Glanzes und der Scheuerfestigkeit erreicht wird.

In all den beschriebenen Anwendungsfällen ist eine Zwischentrocknung durch bekannte Trockner 14 erforderlich.

Bezugszeichenliste

1 erster Bogenführungszylinder
1.1 zweiter Bogenführungszylinder
2 Druckzylinder
3 Gummizylinder
4 Auftragzylinder
5 Plattenzylinder
6 Farbwerk
7 Feuchtwerk
8 Auftrageinrichtung
9 Tauchwalze
10 Einfärbwalze
11 Abdeckhaube
12 Auslagesystem
13 Auslagestapel
14 Trockner
15 Blaseinrichtung
16 Dosierwalze
17 Rakel
18 Trockenwerk
19 Gegendruckzylinder
20 Druckeinrichtung
21 Trockenzylinder
22 Zuführeinrichtung
23 Kasten

Patentansprüche

1. Verfahren zum Verdrucken von Spezialfarben, z. B. Metalldruckfarben, insbesondere in-line in einer Bogenoffsetdruckmaschine mit mindestens einer Druckeinrichtung sowie einer Auftrageinrichtung für die Spezialfarbe, die nach der Prozeßfarbe gedruckt wird, **dadurch gekennzeichnet**, daß die Spezialfarbe direkt über eine eingefärbte reliefartige Druckform in Gestalt einer Flexodruckform oder Hochdruckform auf den Druckbogen übertragen wird.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß nach dem Verdrucken der mindestens einen Prozeßfarbe vor oder nach dem Aufdrucken der Spezialfarbe der Druckbogen lackiert wird.
3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß der aufgetragene Lack vor und/oder nach dem Aufdrucken der Spezialfarbe getrocknet wird.
4. Vorrichtung zur Durchführung des Verfahrens nach mindestens einem der vorhergehenden Ansprüche mit mindestens einer aus einem mit einem Farb- und Feuchtwerk versehenen Plattenzylinder, einem Übertragungszylinder und einem Druckzylinder bestehenden Druckeinrichtung und mindestens einer der Druckeinrichtung nachgeordneten Auftrageinrichtung, dessen gegen einen Gegendruckzylinder stellbarer Auftragzylinder eine Zuführeinrichtung für eine aufbringbare Veredlungsflüssigkeit (Lack; Spezialfarbe) zugeordnet ist, dadurch gekennzeichnet, daß der Auftragzylinder (4) mit einer reliefartigen Druckform in Gestalt einer Flexodruckform oder Hochdruckform für den Auftrag der Veredlungsflüssigkeit versehen ist.
5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Auftrageinrichtung (8) aus einem umstellbaren Lackturm mit einem Gegendruckzylinder (19), einem mit einer reliefartigen Druckform versehenen Auftragszylinder (4) und einer Zuführeinrichtung (22) besteht.
6. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Zuführeinrichtung (22) eine in einem Kasten (23) laufende Tauchwalze (9) und eine gegen den Auftragzylinder (4) gestellte Einfärbwalze (10) aufweist.
7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß der Tauchwalze (9) eine Dosierwalze (16) oder ein Rakel (17) zugeordnet ist, wobei die Tauchwalze als Rasterwalze gestaltbar ist.

8. Vorrichtung nach dem Anspruch 4, dadurch gekennzeichnet, daß das Feuchtwerk (7) der Druckeinrichtung (20) bei abgestelltem Farbwerk (6) als Lackierwerk zum Vorlackieren verwendbar ist.

9. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß ein Trockenwerk (18) zwischen der letzten Druckeinrichtung (20) und der Auftrageinrichtung (8) angeordnet ist.

10. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Druckeinrichtung (20) zwei Auftrageinrichtungen (8) nachgeordnet sind, wovon eine als Lackierwerk und eine als Auftragwerk für die Spezialfarbe einsetzbar ist.

11. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß vor und/ oder nach der Auftrageinrichtung (8) Trockner (14) angeordnet sind.

Hierzu 2 Seite(n) Zeichnungen

Nummer: DE 39 41 571 C2
Int. Cl.⁶: B 41 F 7/02
Veröffentlichungstag: 1. Juni 1995

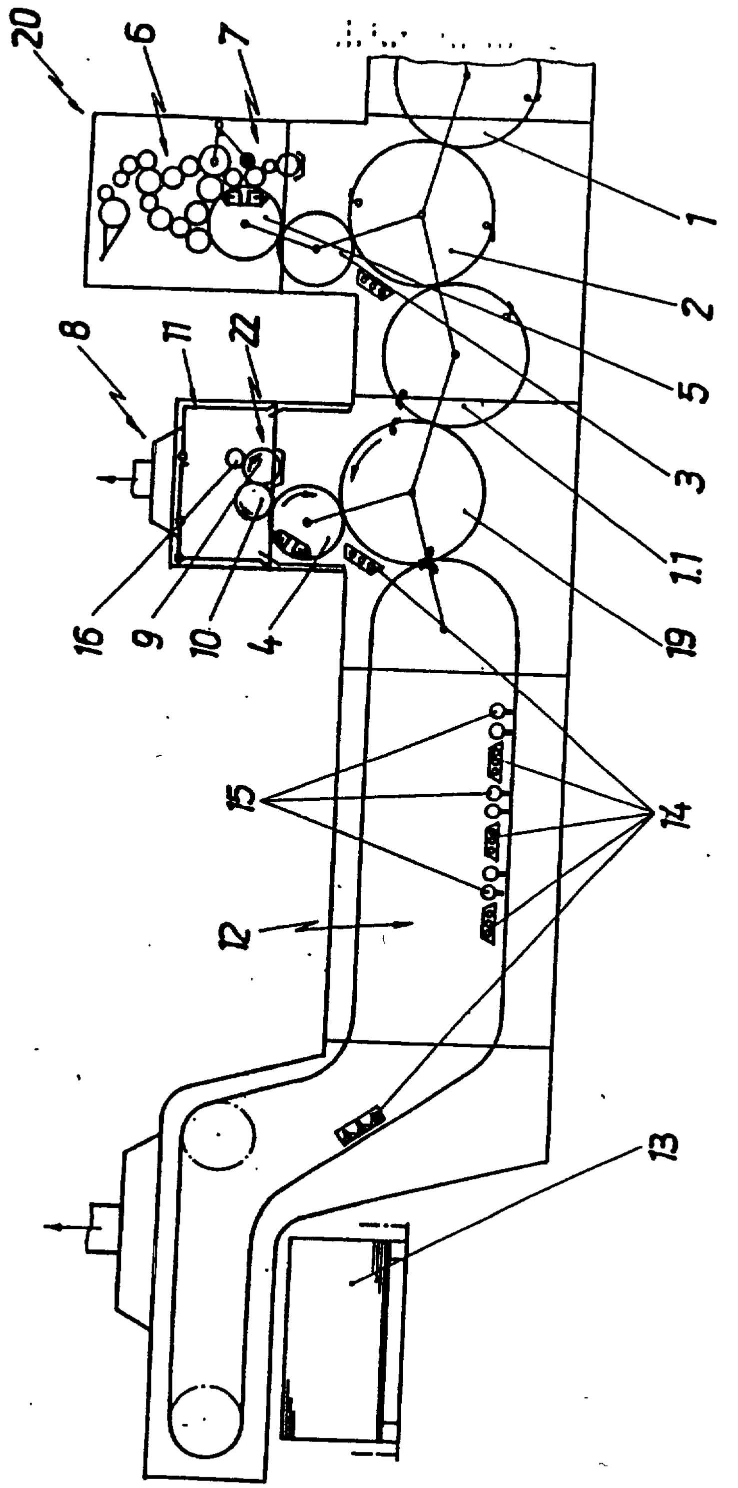

Fig. 1

Nummer: DE 39 41 571 C2
Int. Cl.⁶: B 41 F 7/02
Veröffentlichungstag: 1. Juni 1995

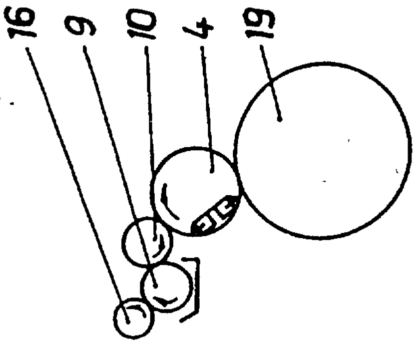

Fig.4

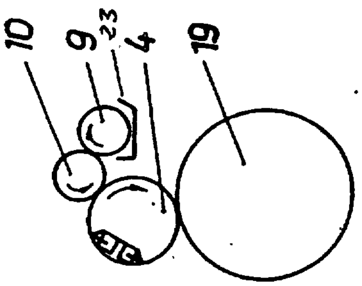

Fig.3

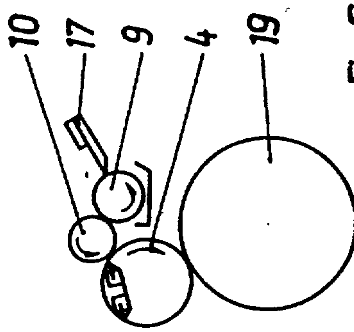

Fig.6

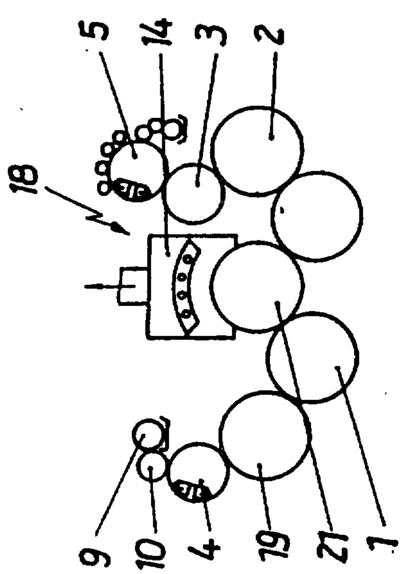

Fig.2

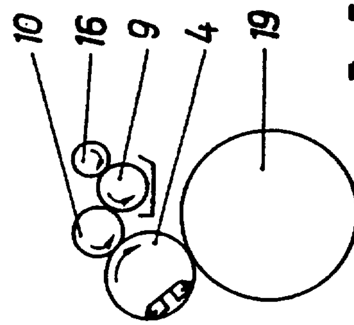

Fig.5

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Offenlegungsschrift**

(10) **DE 42 13 024 A 1**

(51) Int. Cl.⁵:
B 41 F 23/04
B 41 F 7/06
B 41 F 23/08
B 41 F 5/06
B 41 F 5/16
B 41 F 7/02
B 41 F 9/02

(21) Aktenzeichen: P 42 13 024.7
(22) Anmeldetag: 21. 4. 92
(43) Offenlegungstag: 28. 10. 93

DE 42 13 024 A 1

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(56) Für die Beurteilung der Patentfähigkeit in Betracht zu ziehende Druckschriften:

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DE	26 08 661 B2
DE	39 01 174 A1
DE	36 32 744 A1
DE	28 27 520 A1
DE-OS	26 39 900
DE	91 16 208 U1

(54) **Bogendruckmaschine**

(57) Die Erfindung bezieht sich auf eine Bogendruckmaschine für ein mehrfarbiges Bedrucken von zwei Seiten eines Bogens mit mehreren Druckwerken, mit einer Wendeeinrichtung nach den Druckwerken zum Bedrucken der ersten Bogenseite und mit einem Lackierwerk zum Lackieren einer bedruckten Bogenseite, bei der das Bedrucken der beiden Seiten eines Bogens mit mehreren Farben in einem Arbeitsgang durchgeführt wird.

DE 42 13 024 A 1

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

BUNDESDRUCKEREI 09. 93 308 043/61 4/53

Beschreibung

Die Erfindung bezieht sich auf eine Bogendruckmaschine für ein mehrfarbiges Bedrucken von zwei Seiten eines Bogens mit mehreren Druckwerken, mit einer Wendeeinrichtung nach den Druckwerken zum Bedrukken der ersten Bogenseite und mit einem Lackierwerk zum Lackieren einer bedruckten Bogenseite.

Eine derartige Druckmaschine, insbesondere eine Bogenoffsetdruckmaschine, hat normalerweise vier Druckwerke für die vier Grundfarben und eventuelle ein oder zwei Druckwerke für Sonderfarben. Zwischen zwei Druckwerken kann eine Wendeeinrichtung vorgesehen sein, so daß z. B. auf die erste Bogenseite eine Farbe und auf die Rückseite vier Farben aufgedruckt werden. Nach den Druckwerken kann ein Lackierwerk vorgesehen sein, um z. B. dem Druck einen bestimmten Glanz zu verleihen. Falls es jedoch erforderlich war, beide Seiten des Bogens mehrfarbig zu bedrucken, z. B. mit jeweils vier oder fünf Farben, so wurde der Bogenstapel mit auf einer Seite bedruckten Bogen gewendet und noch einmal angelegt, um auch die zweite Bogenseite mehrfarbig zu bedrucken. Dies bedeutet aber den doppelten Zeitaufwand bis zur Fertigstellung der Bogen oder es mußten zwei gleiche Maschinen nacheinander eingesetzt werden. Dies erfordert jedoch an den Maschinen den doppelten Aufwand nicht nur für die Bogenanlage und die Stapelauslage, sondern es mußten auch die Mittel für die Register- und Passerhaltigkeit doppelt vorhanden sein.

Aufgabe der vorliegenden Erfindung ist es, das mehrfarbige Bedrucken der beiden Seiten eines Bogens in einem Arbeitsgang durchzuführen, ohne daß die mehrfarbig bedruckte erste Bogenseite im Schöndruck beim Bedrucken der zweiten Bogenseite im Widerdruck in ihrem Druckbild beschädigt werden kann.

Gemäß der Erfindung wird die Aufgabe dadurch gelöst, daß nach den Druckwerken zum Bedrucken der ersten Bogenseite ein Lackierwerk, eine Trockenstation und danach eine Wendeeinrichtung vorgesehen sind und daß, in Bogentransportrichtung gesehen, nach der Wendeeinrichtung die Druckwerke zum Bedrucken der zweiten Bogenseite angeordnet sind. Mit einer derartig ausgebildeten Druckmaschine ist es möglich, einen Bogen z. B. aus Kunstdruckpapier auf beiden Seiten beispielsweise mit vier oder fünf Farben zu bedrucken und danach in bekannter Weise auf einem Bogenstapel abzulegen. Es kann somit eine Inline-Fertigung von hochwertigen Druckprodukten in einer Maschine erfolgen bei höchster Passer- und Registerhaltigkeit, ohne daß der Zeitaufwand, und damit die Kosten, erhöht werden.

In einer vorteilhaften Ausgestaltung der Erfindung sind nach dem letzten Druckwerk ein weiteres Lackierwerk und danach eine zweite Trockenstation vorgesehen. Es können somit auch hochwertige Kunstdrucke, die beiderseits lackiert sind, in einem Arbeitsgang in einer Maschine hergestellt werden.

Gemäß einer weiteren vorteilhaften Ausgestaltung der Erfindung besitzt die erste Trockenstation Baugruppen eines Lackierwerks und die zweite Trockenstation ist nach dem letzten Druckwerk im Bereich einer Verlängerung des Ausleger-Kettensystems vorgesehen. Hierbei ist es vorteilhaft, wenn die erste Trockenstation im Seitengestell eines Lackierwerks eingebaut ist. Hierdurch sind erhebliche Kosteneinsparungen möglich, ohne daß das Aussehen der Maschine beeinträchtigt wird.

In einer dritten vorteilhaften Ausgestaltung ist die zweite Trockenstation in Seitenteilen eingebaut, die die Seitenteile des letzten Lackierwerks mit den Seitenteilen der Stapelauslage verbindet. Hierbei sind in den Trockenstationen über die Bogenbreite reichende Wärmequellen vorgesehen, an denen die frisch bedruckten Bogenseiten vorbeibewegt werden.

Durch die erfindungsgemäße Ausgestaltung der Maschine werden der hohe Zeitaufwand und die Problematik beim zweimaligen Durchlaufen der Bogen durch die Druckmaschine vermieden. Außerdem ist der erste Aufdruck auf der Schöndruckseite fertig lackiert und getrocknet, bevor er in die Druckwerke für den zweiten Aufdruck einläuft, so daß die erste bedruckte Bogenseite ausgetrocknet ist und ein Abschmieren verhindert wird.

Ein Ausführungsbeispiel der Erfindung ist in der Zeichnung schematisch dargestellt.

Die zu bedruckenden Bogen werden bei der wiedergegebenen Bogenoffsetdruckmaschine von einem Anlegerstapel 1 über einen Anlegetisch 2 dem ersten Druckwerk 3 zugeführt. Diesem Druckwerk 3 können sich mehrere weitere Druckwerke 4 anschließen, so daß mit diesen Druckwerken z. B. ein vierfarbiger Schöndruck auf der ersten Bogenseite erzeugt wird. Nach den Druckwerken 3, 4 ist ein Lackierwerk 5 vorgesehen, mit dem der erste mehrfarbige Aufdruck lackiert werden kann. Danach ist, in Bogentransportrichtung gesehen, eine Trockenstation 6 vorgesehen, mit der die bedruckte und lackierte erste Bogenseite getrocknet wird, um bei der nachfolgenden Weiterverarbeitung eine Beschädigung derselben zu vermeiden. Für die Trockenstation 6 können Seitengestelle 7 benutzt werden, wie sie normalerweise für ein Lackierwerk verwendet werden, so daß kein zusätzlicher Bauaufwand erforderlich ist. In der Trockenstation 6 sind Wärmequellen 8 vorgesehen, die über die Bogenbreite reichen und auf die frisch bedruckte Bogenseite gerichtet sind.

Nach der Trockenstation 6 ist, in Bogenlaufrichtung gesehen, eine Wendeeinrichtung 9 vorgesehen, mit der die einseitig bedruckten Bogen gewendet werden, um danach auf ihrer zweiten Seite bedruckt zu werden. Hierzu sind nach der Wendeeinrichtung 9 weitere Druckwerke 10, 11 vorgesehen, wobei es sich in der Praxis auch hier normalerweise um mindestens vier Druckwerken handelt. Mit diesen Druckwerken wird die zweite Bogenseite im Widerdruck mehrfarbig bedruckt.

Nach dem letzten Druckwerk 11 kann ein weiteres Lackierwerk 12 vorgesehen sein, um auch die zweite Bogenseite mit einem Lackaufdruck zu versehen. Von einem Ausleger-Kettensystem 13 werden sodann die bedruckten und lackierten Bogen einer Stapelauslage 14 zugeführt und auf einem Stapel 15 abgelegt. Zwischen den Seitenteilen 16 des letzten Lackierwerks 12 und den Seitenteilen 17 der Stapelauslage 14 sind Seitenteile 18 vorgesehen, in denen über die Bogenbreite reichende Wärmequellen 19 angeordnet sind. Von dem Ausleger-Kettensystem 13 werden die bedruckten und lackierten Bogen mit ihrer frisch bedruckten zweiten Bogenseite an den Wärmequellen 19 vorbeibewegt. Die Seitenteile 18 dienen hierbei der Verlängerung der Trockenstrecke und verbinden die Seitenteile 17 der Stapelauslage 14 mit den Seitenteilen 16 des letzten Lackierwerks 12. Die zweite Trockenstation 20 bzw. die Seitenteile 18 können in ihrer Länge an die jeweiligen Erfordernisse für die Trocknung angepaßt werden.

Teileliste

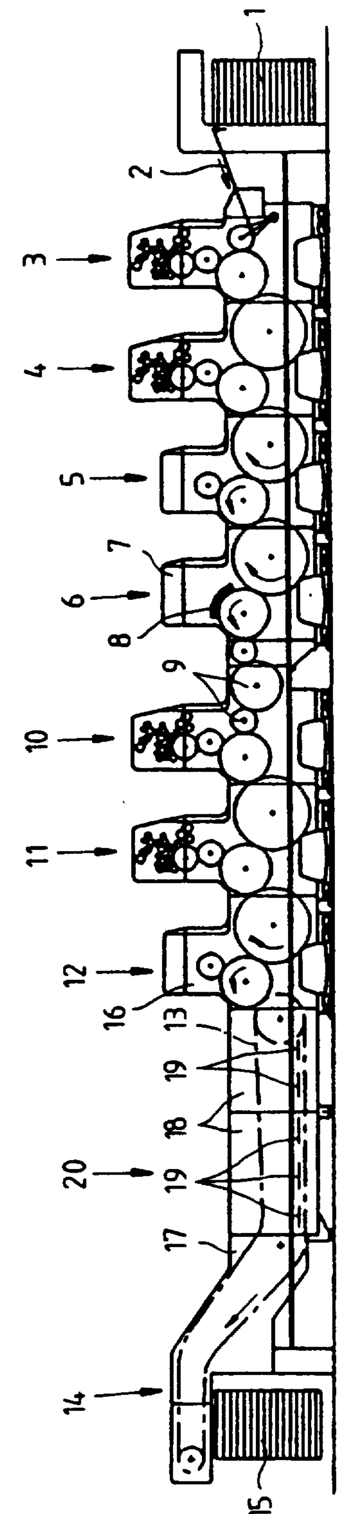
1 Anlegerstapel
2 Anlegetisch
3 Druckwerk
4 Druckwerk
5 Lackierwerk
6 Trockenstation
7 Seitengestell
8 Wärmequelle
9 Wendeeinrichtung
10 Druckwerk
11 Druckwerk
12 Lackierwerk
13 Ausleger-Kettensystem
14 Stapelauslage
15 Stapel
16 Seitenteil
17 Seitenteil
18 Seitenteil
19 Wärmequelle
20 Trockenstation

Patentansprüche

1. Bogendruckmaschine für ein mehrfarbiges Bedrucken von zwei Seiten eines Bogens mit mehreren Druckwerken, mit einer Wendeeinrichtung nach den Druckwerken zum Bedrucken der ersten Bogenseite und mit einem Lackierwerk zum Lackieren einer bedruckten Bogenseite, **dadurch gekennzeichnet**, daß nach den Druckwerken (3, 4) zum Bedrucken der ersten Bogenseite ein Lackierwerk (5), eine Trockenstation (6) und danach eine Wendeeinrichtung (9) vorgesehen sind und daß, in Bogentransportrichtung gesehen, nach der Wendeeinrichtung (9) die Druckwerke (10, 11) zum Bedrucken der zweiten Bogenseite angeordnet sind.
2. Bogendruckmaschine nach Anspruch 1, dadurch gekennzeichnet, daß nach dem letzten Druckwerk (11) ein weiteres Lackierwerk (12) und danach eine zweite Trockenstation (20) vorgesehen sind.
3. Bogendruckmaschine nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die erste Trockenstation (6) Baugruppen eines Lackierwerks besitzt und die zweite Trockenstation (20) nach dem letzten Druckwerk (11) im Bereich einer Verlängerung des Ausleger-Kettensystems (13) vorgesehen ist.
4. Bogendruckmaschine nach Anspruch 3, dadurch gekennzeichnet, daß die erste Trockenstation (6) in Seitengestellen (7) eines Lackierwerks eingebaut ist.
5. Bogendruckmaschine nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die zweite Trockenstation (20) in Seitenteilen (18) eingebaut ist, die die Seitenteile (16) des letzten Lackierwerks (12) mit den Seitenteilen (17) der Stapelauslage (14) verbinden.
6. Bogendruckmaschine nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß in den Trockenstationen (6, 20) über die Bogenbreite reichende Wärmequellen (8, 19) vorgesehen sind, an denen die frisch bedruckte Bogenseite vorbeibewegt wird.

Hierzu 1 Seite(n) Zeichnungen

Nummer: DE 42 13 024 A1
Int. Cl.^{5}: B 41 F 23/04
Offenlegungstag: 28. Oktober 1993



A

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT

(12) **Gebrauchsmuster** U1

(11) Rollennummer G 93 05 552.8

(51) Hauptklasse B41F 7/06

Nebenklasse(n) B41F 5/24 B41F 31/06

B41F 9/10 B41F 9/16

B05C 1/08

(22) Anmeldetag 16.04.93

(47) Eintragungstag 03.06.93

(43) Bekanntmachung im Patentblatt 15.07.93

(54) Bezeichnung des Gegenstandes
Einrichtung zum Inline-Beschichten von Bedruckstoffen in Offsetdruckmaschinen

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Einrichtung zum Inline-Beschichten von Bedruckstoffen in Offsetdruckmaschinen

Die Erfindung betrifft eine Einrichtung zum Beschichten von Bedruckstoffen in Mehrfarben-Offsetdruckmaschinen mit mehreren Lackierwerken.

In der Zeitschrift FlexoDruck, 2-93, Seite 42-43, ist im Artikel "Goldlackdruck löst Metall-Bronzierung ab" angegeben, daß in einer Mehrfarben-Offsetdruckmaschine mit zwei sogenannten Lacktürmen eine Goldlackfarbe verarbeitet wurde. Dazu wurde ein Lackturm als Flexodruckwerk umgerüstet, wobei mit konventioneller Lackiertechnik eine Flexodruckplatte zum Beschichten eingesetzt wurde. Gegenüber der konventionellen Lackdosierung wurde auf die Option zur Verwendung eines Kammerrakels hingewiesen.

Ein Auftragswerk für hochviskose, ölhaltige oder niedrigviskose wasserlösliche Schichten ist aus der DE 3 906 648 A1 bekannt. Dieses Auftragswerk ist als Lackiereinrichtung, wahlweise als Offset-, Hochdruck- oder Tiefdruckwerk ausgebildet. Die Ausführungen gehen von einer strukturierten Schöpfwalze aus, die mit einem Rakelblatt korrespondierend bzw. von einer Auftragwalze und einem strukturierten Formzylinder, der mit einem Rakelblatt korrespondiert. Das Hochdruckwerk besteht dabei aus einer mit Näpfchen profilierten Schöpfwalze, der ein Rakelblatt zugeordnet ist, einer Übertragwalze, der Glättwalzen zugeordnet sind und einem Formzylinder mit Hochdruckform.

Aus der DE 4 122 990 A1 sind eine Bronze- und Effektdruckfarbe und ein Verfahren zur Herstellung eines Bronze- und Effektdruckes

bekannt. Dort wird eine wasserverdünnbare Druckfarbe mit hoher Viskositāt und hohem Pigmentanteil beschrieben. Diese soll aus dem Lackwerk einer Offsetmaschine oder einem Flexodruckwerk verarbeitet werden. Als Vorteil wird der kurze Verarbeitungsweg mit wenigen Farbspaltungen angegeben.

Beispielsweise aus der DE 3 614 582 A1 ist ein sogenanntes Kammerrakel zum Auftragen einer Beschichtungsmasse auf eine Beschichtungswalze bekannt. Mindestens zwei, an einer Walze anliegende, Rakelblätter bilden eine Kammer zur Aufnahme einer Masse, die unter Druck zugeführt wird.

Aufgabe der Erfindung ist es, eine Beschichtungseinrichtung nach dem Oberbegriff des Anspruchs 1 weiterzuentwickeln, um auf einfache Weise eine problemlose Inline-Verarbeitung von schnellverdunstenden Druckfarben mit hohem Pigmentanteil bzw. groben Pigmenten kombiniert mit weiterbehandelnden Druck- oder Beschichtungsvorgängen zu ermöglichen.

Gelöst wird die Aufgabe durch den kennzeichnenden Teil des Hauptanspruches. Weiterbildungen ergeben sich aus den Unteransprüchen.

Die erfindungsgemäße Lösung gestattet es, das Inline-Beschichten mit höherviskosen Flüssigkeiten in einer Offsetdruckmaschine vorzunehmen unter besonderer Berücksichtigung von Lacken bzw. pigmentierten Farben auf Wasserbasis (Metallglanzdrucke). Einsatzgebiete bestehen für ausgespartes Lackieren (Spotlackierung) oder vollflächiges Lackieren. Aufgrund der geschlossenen Kammer beim Kammerrakel wird die Verdunstung der verwendeten Flüssigkeit reduziert. Dadurch wird die Verarbeitung von schnell verdunstenden, z.B. wasserlöslichen Flüssigkeiten verbessert. Die Kombination von mehreren Offsetdruckwerken und mindestens einem Flexodruckwerk kann in unterschiedlichen Anordnungen erfolgen, wobei diesen Einrichtungen in der Regel eine weitere Lackiereinrichtung, z.B. zum vollflächigen Lackieren, nachgeordnet ist.

Die Erfindung wird im Folgenden beispielhaft erläutert. Dabei zeigt

Fig. 1 eine erste Einrichtung zum Beschichten und

Fig. 2 eine Variante der Einrichtung zum Beschichten.

In Figur 1 ist eine Mehrfarben-Offsetdruckmaschine mit zwei Lakkiereinrichtungen gezeigt. Die Offsetdruckmaschine (hier ohne An- und Ausleger) besteht aus fünf Druckwerken 1 bis 5, daran in Bogenlaufrichtung angeschlossen einer als Flexodruckwerk 6 ausgerüsteten Beschichtungseinrichtung und einer dieser nachgeordneten herkömmlichen Lackiereinheit 7. Dabei kann das Flexodruckwerk 6 als Spotlackiereinrichtung (für ausgespartes Lackieren) und die nachgeordnete Lackiereinheit 7 zum vollflächigen Oberflächenfinishing eingesetzt werden.

Die Flexodruckwerk 6 wie auch die Lackiereinheit 7 bestehen aus je einem Druckzylinder 8.1, 8.2, einer Transfertrommel 9.1, 9.2 und einem Formzylinder 10.1, 10.2.

In der Flexodruckwerk 6 ist auf den Formzylinder 10.1 eine flexible Hochdruckplatte aufgespannt, zB. eine Flexodruckplatte. In Kontakt mit dem Formzylinder 10.1 ist eine Auftragwalze 11 mit strukturierter Oberfläche mit Rasternäpfchen, eine sogenannte Rasterwalze, angeordnet. An die Auftragwalze 11 anstellbar ist dieser ein Kammerrakel 12 zugeordnet. Das Kammerrakel 12 kann zB. an seiner Oberseite mittig mit einem Flüssigkeitszulauf und zwei austretende Flüssigkeitsabläufen im Bereich der Seitenteile versehen sein. Der Flüssigkeitszulauf ist mit einer Förderpumpe, die Flüssigkeitsabläufe 11 hingegen mit einer Saugpumpe verbunden. Die Pumpen sind erforderlich, um speziell durch die Pigmentierung höherviskose Flüssigkeit z.B. auf Wasserbasis, wie z.B. Gold- und Silberdruckfarbe, Deckweiß oder Lack, verarbeiten zu können.

Über die Rasternäpfchen der Auftragwalze 11 wird die Beschichtungsmasse zum Einfärben der Hochdruckform auf den Formzylinder

10.1 transportiert und auf den vom Druckzylinder 8.1 zugeführten Bedruckstoff aufgebracht. Während des von der Auftragwalze 11 bewirkten Flüssigkeitstransports sorgt die Kammerrakel 12 dafür, daß die Flüssigkeit ausschließlich in den Rasternäpfchen verbleibt.

Die Lackiereinheit 7 weist demgegenüber eine Walzenpaar zur Bildung eines Dosierspalts auf. Dabei ist eine Dosierwalze 13 an eine Auftragwalze 14 angestellt. Die Beschichtungsmasse wird direkt in den Spalt zwischen beiden Walzen eingeführt und über die Auftragwalze 14 dem Formzylinder 10.2 zugeführt. Dieser trägt sie dann am Druckzylinder 8.2 auf den zugeführten Bedruckstoff auf.

Durch die Staffelung Offsetdruck, Flexodruck und Lackieren ist speziell für Metallglanz-Beschichtungen ein besonders gutes Arbeitsergebnis erzielbar. Dabei ist die Kombination von schneller Verarbeitung der leicht verdunstenden Metalldruckfarbe bzw. des Drucklacks mit einer nachträglichen, den Glanz erhöhenden Lackbeschichtung hervorzuheben.

Ein vergleichbares System ist in Figur 2 dargestellt. Hier ist das Flexodruckwerk 6 vor dem ersten Druckwerk 1 der Offsetdruckmaschine eingesetzt. Mit einer derartigen Konfiguration lassen sich Basisbeschichtungen vor dem Drucken aufbringen, z.B. Deckweiß-Beschichtungen auf Blechmaterial, Kunststoffolie oder Karton. Die abschließende Lackierung kann weiterhin dadurch ermöglich werden, daß ein Lackierwerk 7 nach dem letzten Druckwerk 5 oder auch ein intergriertes Lackierwerk an einem konventionellen Druckwerk angeordnet ist.

Vergleich ist auch eine Anordnung des Flexodruckwerkes 6 innerhalb der Offsetdruckmaschine zum Aufbringen von Zwischenbeschichtungen etwa mit Trocknungsfunktion.

Ansprüche

1.) Einrichtung vorzugsweise in Bogenrotationsdruckmaschinen für mehrfarbigen Offsetdruck zum Beschichten von Bedruckstoffen mit wenigstens zwei Lackiereinheiten,
d a d u r c h g e k e n n z e i c h n e t,
daß jede Lackiereinheit einen Druckzylinder (8), einen Formzylinder (10) und eine Auftragwalze (11,14) enthält und die entsprechend Bogenlaufrichtung vorgeordnete Lackiereinheit als Flexodruckwerk (6) ausgebildet ist.

2.) Einrichtung nach Anspruch 1,
d a d u r c h g e k e n n z e i c h n e t,
daß im Flexodruckwerk (6) eine Auftragwalze (11) vorgesehen ist, an die ein Kammerrakel (12) anstellbar angeordnet ist, wobei die Auftragwalze (11) als Rasterwalze ausgebildet ist.

3.) Einrichtung nach Anspruch 1 und 2,
d a d u r c h g e k e n n z e i c h n e t,
daß dem Flexodruckwerk (6) eine konventionelle Lackiereinheit (7) direkt oder indirekt nachgeordnet ist und in der Lackiereinheit (7) eine Auftragwalze (14) vorgesehen ist, der eine Dosierwalze (13) zur Bildung eines gemeinsamen Dosierspaltes anstellbar zugeordnet ist.

4.) Einrichtung nach Anspruch 1 und 2,
d a d u r c h g e k e n n z e i c h n e t,
daß das Flexodruckwerk (6) aus folgenden Elementen besteht: dem, eine Hochdruckform tragenden Formzylinder (10.1), der mit dem Druckzylinder (8.1) in Kontakt steht, der Auftragwalze (11) mit Rasterstruktur, die mit dem Formzylinder (10.1) in Kontakt steht und dem Kammerrakel (12) besteht, das mit einer

Förderpumpe zur Flüssigkeitszufuhr und einer Saugpumpe zur Flüssigkeitsrückführung verbunden ist.

5.) Einrichtung nach Anspruch 1 und 2,
d a d u r c h   g e k e n n z e i c h n e t,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine zwischen den Druckwerken (1-5) angeordnet ist.

6.) Einrichtung nach Anspruch 1 und 2,
d a d u r c h   g e k e n n z e i c h n e t,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine den Druckwerken (1-5) vorgeordnet ist.

7.) Einrichtung nach Anspruch 1 und 2,
d a d u r c h   g e k e n n z e i c h n e t,
daß das Flexodruckwerk (6) in einer Offsetdruckmaschine den Druckwerken (1-5) nachgeordnet ist.

B

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November 20, 2000

I, Christian König, hereby swear, under penalty of perjury, that the attached document was translated by me and to the best of my knowledge and belief is a true and accurate translation of the corresponding German document:

Gebrauchsmuster G 93 05 552.8

(Christian König)

1

(19) Federal Republic of Germany
German Patent Office

(12) **Utility model**

U1 U

(11) Register number G 93 05 552.8
(51) Main classification B41F 7 06
Secondary classes B41F 5 24 B41F 31 06
B41F 9 10 B41F 9 16
B05C 1 08

(22) Filing date April 16th, 1993
(47) Registration date June 3rd, 1993
(43) Disclosure in Patent Gazette July 15th, 1993

(64) Subject matter
Device for inline-coating of materials to be printed in offset printing presses.

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(74) Name and residence of representative
Marek, J., Cert. Eng., Patent barrister, 6053 Obertshausen

Stamp:
Period for opposition:

Supervision			In case of opposition please send back to PW immediately
Access to records			
Opposition	X	H 8	
Conflict			
U 93/097AE			**E**

MAN Roland Druckmaschinen AG
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Device for inline-coating of materials to be printed in offset printing presses

The invention concerns a device for the coating of materials to be printed in multi-color offset printing presses with several coating stations.

The article "*Goldlackdruck löst Metall-Bronzierung ab*[1]" in the magazine *FlexoDruck*, 2-93, pages 42-43 describes the processing of gold lacquer in a multi-color offset printing press with two so-called coating towers. For this purpose, one of the coating towers was converted to a flexographic station, whereby a flexographic printing plate was used for coating, together with conventional lacquering technology. In regard to conventional metering methods for lacquer, the option of using a chamber doctor was pointed out.

DE 3 906 648 A1 describes an applicator unit for high-viscosity oil-based, or low-viscosity water-soluble layers. This applicator unit is configured as a coating unit, alternatively as an offset-, relief-, or intaglio-printing unit. These configurations are based on a textured pick-up roller, which is in contact with a doctor blade, or on an applicator roller and a textured form cylinder, which is in contact with a doctor blade. Hereby, the relief-printing unit consists of a pick-up roller that contains ink cells, and to which a doctor blade is assigned, a transfer roll, to which smoothing rolls are assigned, and a form cylinder that carries a relief form.

[1] Gold lacquer printing replaces metal-bronzing (The Translator)

DE 4 122 990 A1 describes a bronze- and effect printing ink and a process for bronze- or effect printing. It describes a water-soluble printing ink of high viscosity and high pigment content. This ink is to be processed out of the coating station of an offset machine or out of a flexographic station. The short processing path with few ink separations is listed as an advantage.

A so-called chamber doctor for applying a coating material onto a coating roller is well known, e.g. from DE 3 614 582 A1. At least two doctor blades are in contact with a roller and form a chamber for accepting a material, which is supplied under pressure.

Object of the invention is to further develop a coating station according to the characterizing portion of claim 1, to allow in a simple manner the problem-free inline processing of quickly evaporating printing inks with high pigment content or rough pigments in combination with further subsequent printing- and coating processing steps

This objective is solved by the characterizing portion of the independent claim. Further developments follow from the dependent claims.

This invention's solution makes it possible to carry out inline-coating in an offset printing press using high-viscosity liquids, with special consideration for water-based lacquers or pigmented inks (metallic gloss printing). Potential fields of application are the selective coating (spot coating) or the coating of complete areas. Evaporation of the employed liquids is reduced due to the closed design of the chamber of the chamber doctor. This improves the processing of quickly evaporating, e.g. water-soluble, liquids. The combination of several offset printing stations and at least one flexographic station can be implemented in various configurations, whereby as a rule an additional lacquering station, e.g. for the coating of solid areas, is positioned downstream of these devices.

In the following, the invention is explained by way of example.

Fig. 1 shows a first installation for coating, and

Fig. 2 shows a variant of the coating installation.

Figure 1 shows a multi-color offset printing press with two lacquering stations. The offset printing press (shown here without the feeder- and delivery attachments) consists of five printing stations 1 to 5, connected thereto in sheet running direction a coating station configured as a flexographic station 6, and downstream thereof a conventional lacquering station 7. Hereby, the flexographic station 6 can be employed as a spot coating device (for selective lacquering) and the downstream lacquering station 7 can be employed for solid-area surface finishing.

The flexographic station 6, as well as the lacquering station 7, each consist of one impression cylinder 8.1, 8.2, one transfer drum 9.1, 9.2, and one form cylinder 10.1, 10.2.

A flexible relief printing plate, e.g. a flexographic printing plate, is mounted on the form cylinder 10.1 in the flexographic station 6. An applicator roller 11 with a surface textured with ink cells, a so-called anilox roller, is in contact with the form cylinder 10.1. A doctor chamber 12 is associated with, and can be positioned on, the applicator roller 11. The doctor chamber 12 can, for example, be equipped with a supply inlet for liquids centered on its top panel and with two discharging outlets for liquids in its lateral areas. The liquid-supply inlet is connected to a feed pump, while the liquid-discharge outlets 11 are connected to a suction pump. The pumps are required to be able to process a liquid that is of high viscosity due to the pigmentation, e.g. a water-based liquid, such as for example gold- and silver printing ink, opaque white, or lacquer.

The ink cells of the applicator roller 11 transport the coating material for the inking of the relief form to the form cylinder 10.1, where the coating material is applied to the material to be printed that is being fed by the impression cylinder 8.1. While the applicator roller 11 provides for the transport of liquids, the chamber doctor ensures that the liquid remains only in the ink cells.

In contrast, the lacquering station 7 contains a roller pair that forms a metering nip. Herein, a metering roller 13 is positioned directly on an applicator roller 14. The coating substance is fed directly into the nip between the two rollers and is supplied to the form cylinder 10.2 by the applicator roller 14. At the impression cylinder 8.2, the form cylinder then applies the coating substance onto the material to be printed that is being supplied.

The staggered arrangement of offset printing, flexography, and lacquering yields very good operational results, especially in metal-gloss coatings. Hereby one must emphasize the combination of rapid processing of the quickly-evaporating metallic printing ink or printing lacquer and the subsequent coating with lacquer, which improves the gloss.

Fig. 2 shows a similar system. Here, the flexographic station 6 is employed upstream of the first printing station 1 of the offset printing press. Using such a configuration, it is possible to apply base-coatings prior to printing, e.g. opaque white coatings on sheet metal, plastic film, or card stock. Furthermore, the final lacquering can be achieved by placing a lacquering station 7 downstream of the final printing station 5, or by arranging an integrated lacquering unit with a conventional printing station.

Also comparable[2] is a placement of the flexographic station 6 within the offset printing press for applying intermediary coatings, for instance including a drying function.

[2] The German original suffers from poor grammar, which makes a determination of the exact meaning impossible. This interpretation assumes the German 'Vergleich' is meant to read 'Vergleichbar' (The Translator).

Claims

1.) Device, preferably in sheet-fed rotary printing presses for multi-color offset printing for the coating of materials to be printed containing at least two lacquering stations,
whereby
each lacquering station comprises one impression cylinder (8), one form cylinder (10), and one applicator roller (11, 14), and the lacquering station that is upstream with respect to the sheet running direction is configured as a flexographic station (6).

2.) Device according to claim 1 wherein
the flexographic station (6) is equipped with an applicator roller (11), with which is associated an adjustable chamber doctor (12), whereby the applicator roller (11) is configured as an anilox roller.

3.) Device according to claim 1 and 2 wherein
a conventional lacquering station (7) is located directly or indirectly downstream of the flexographic station (6), and the lacquering station (7) is equipped with an applicator roller (14), with which is associated an adjustable metering roller (13) to form a common metering nip.

4.) Device according to claims 1 and 2 wherein
the flexographic station (6) consists of the following elements:
the form cylinder (10.1), which carries a relief form and is in contact with the impression cylinder (8.1), the applicator roller (11) with screen texture, which is in contact with the form cylinder (10.1), and the chamber doctor, which is equipped with a feed pump for liquid supply and a suction pump for liquid return.

5.) Device according to claims 1 and 2 wherein the flexographic station (6) in an offset printing press is placed in between the printing stations (1-5).

6.) Device according to claims 1 and 2 wherein the flexographic station (6) in an offset printing press is placed upstream of the printing stations (1-5).

7.) Device according to claims 1 and 2 wherein the flexographic station (6) in an offset printing press is placed downstream of the printing stations (1-5).

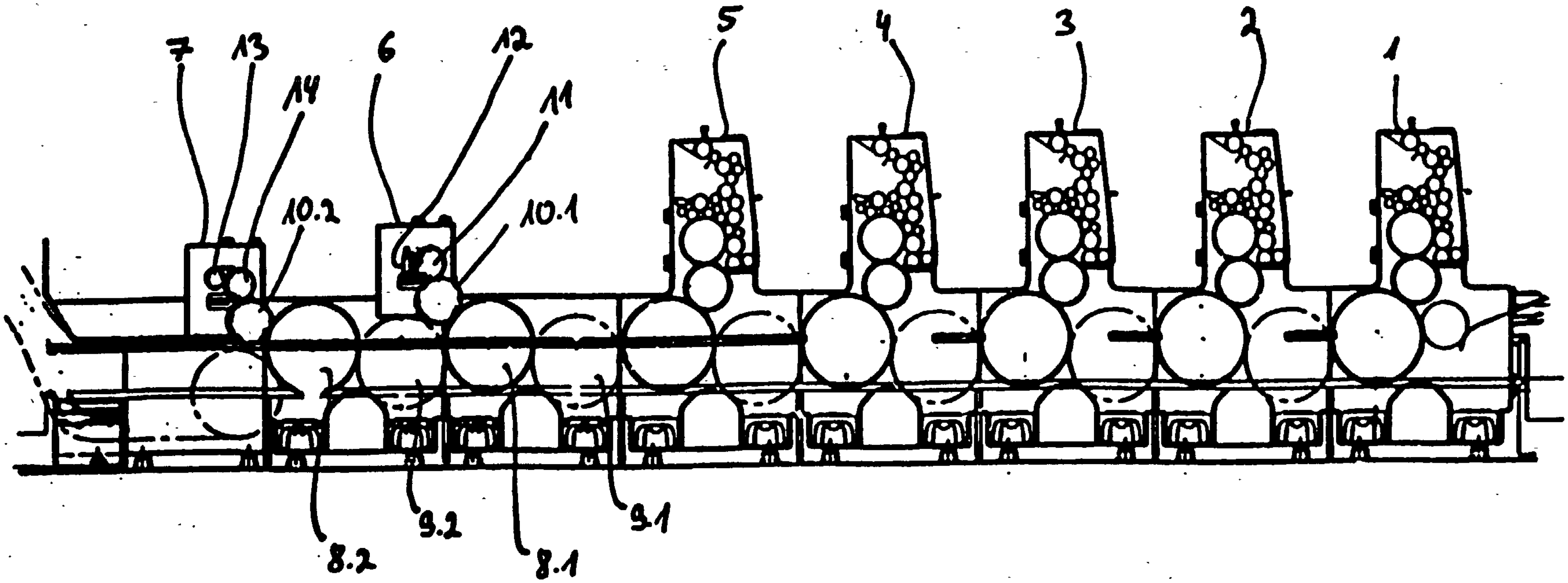

Fig. 1

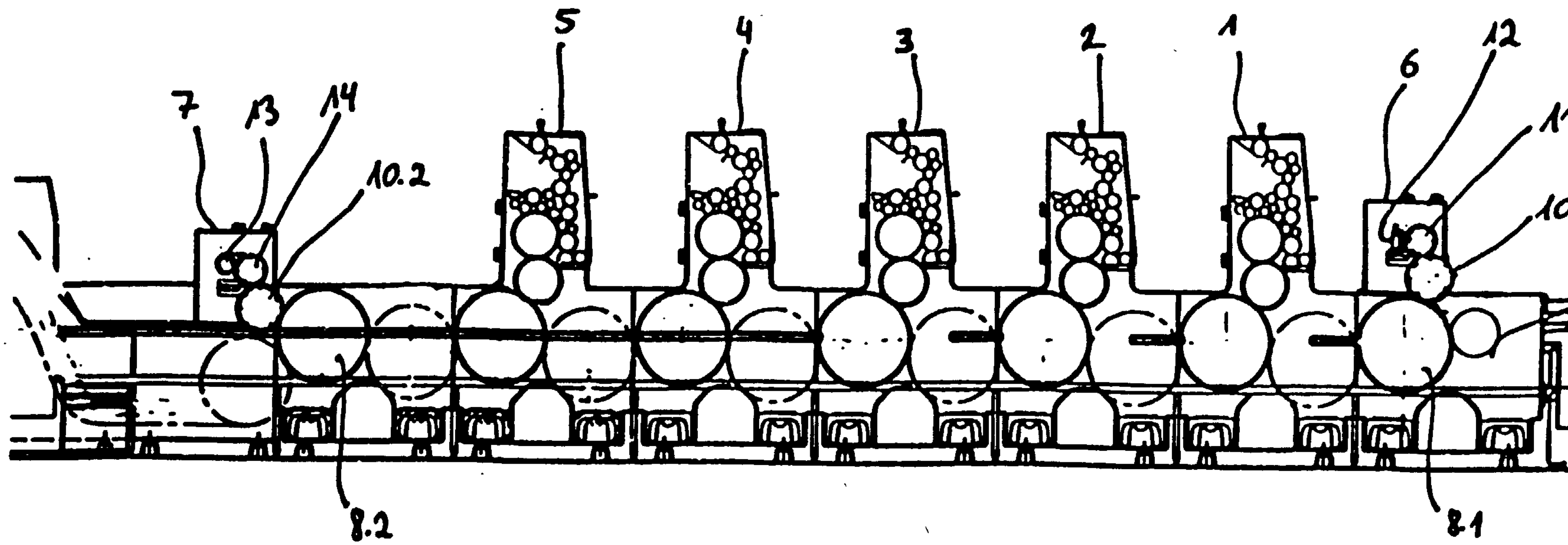

Fig. 2

C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:		§	
	BILL L. DAVIS and JESSE S. WILLIAMSON	§	
		§	
For Reissue of	U. S. Patent 5,630,363	§	Group Art Unit: 2854
	Issued May 20, 1997	§	
	Serial No. 08/515,097	§	
		§	
Filing Date:	May 20, 1999	§	Examiner: S. Funk
		§	J. Hilten
		§	
Serial No.:	09/315,796	§	
		§	
For:	**COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

SIXTH DECLARATION OF RAYMOND J. PRINCE

1. I am the same Raymond J. Prince who has executed previous declarations in this proceeding.

2. I have had the opportunity of reviewing the sworn translation (Exhibit "A" hereto) of Gebrauchsmuster ("utility model") G 93 05 552.8 of the Federal Republic of Germany (Exhibit "B" hereto), filed April 4, 1993 and supposedly "laid open" for public examination on or about July 15, 1993. The text of the Gebrauchsmuster, with seven claims, appears to be the same German text (group Exhibit "C" hereto) that appeared in the German application priority document which in the file history of EP 620,115 (B1) (also group Exhibit "C") was the subject of my Fifth Declaration and was printed and published, according to its cover, on October 19, 1994. I understand that the Gebrauchsmuster itself (Exhibit "A" hereto) was neither printed nor published on July 15, 1993, but from the representations (Exhibit "D" hereto) of Lars Manke, a German national patent agent and supposed "legal expert" on German utility models on behalf of PRI, the Gebrauchsmuster was "registered" on June 3, 1993, and the file of Gebrauchsmuster G 93 05 552.8 was "laid open" on July 15, 1993, and as the "registration" was published in the German official Patent Gazette as the unofficial utility model bulletin on July 15, 1993 (group Exhibit "E"), a copy of the Gebrauchsmuster could have been ordered on July 15, 1993.

3. I further understand that Gebrauchsmusters are available as foreign patents under 35 U.S.C. §102(b) if timely available, and if the Gebrauchsmuster G 93 05 552.8 was available to be

ordered on July 15, 1993, its claims – and its claims only – would be prior art to U.S. Patent No. 5,630,363. I also understand that some case law exists in the United States that while the specification and drawings of Gebrauchsmuster G 93 05 552.8 are not available as prior art, under such case law one may use the specification and drawings to fairly interpret the meaning of any relevant German claims. I understand that processes cannot be claimed in German Gebrauchsmusters. I have been asked to give my opinion if any of the claims of the Gebrauchsmuster meet the claim limitations of any of the claims of the pending reissue application or the issued '363 patent or put one of ordinary skill in the art in August 1995 in possession of the claimed invention of Claims 1-87 of the pending reissue application (Exhibit "F" hereto), or make the subject matter of these claims obvious to one of ordinary skill in the art.

4. I interpret Claims 1-4 and Claim 7 pertain to an article of manufacture ("device") with an end-of-press tower coater. I interpret Claims 5-6 as possibly referring to a device having an interstation or upstream tower coater. Of particular interest is the alternative of Claims 5 or 6 dependent on Claim 2, as opposed to Claim1. I have reviewed Exhibit "A" and "B" and would like to make the following comments to the document, and specifically comment on Claims 5 and 6.

5. For the reasons that follow, none of the proposed reissue Claims 1-87 nor the underlying claims of the '363 are fairly taught by Claims 5-6 of the Gebrauchsmuster, or are obvious to one of ordinary skill in the art in view of said Claims 5-6 of the Gebrauchsmuster, whether or not the specification is available for interpretation of the claims.

6. First, the Gebrauchsmuster does not mention its application to the printing of metallic inks, and does not contain the text of the WIMS patent, U.S. Patent No. 5,370,976 to Doughty and Williamson, that would supply the motivation needed in the period of July 1993 - August 1995 for one to try going "up front" with a tower coater. The Gebrauchsmuster does not indicate the use of metallic inks in front of the lithographic unit.

7. Second, no detail is made of flexographic inks or plates. Indeed, Claims 5-6 do not mention an expected advantage of printing metallic inks (increased brilliance) or any other advantage. In fact, the Gebrauchsmuster does not describe the use of flexographic plate for the purpose of printing dots in front of the lithographic units.

8. Third, there is no mention of half-tone printing, only flood (possibly spot) coating of opaque whites. The Gebrauchsmuster (See Exhibits "A" and "B") does state the up front units will be used for printing opaque white. This is normally done for the reason of printing process color on

metalized foil. What is done is to lay white and then print process color via lithography on top of the opaque white.

9. Fourth, Claims 5-6 and the underlying specification do not teach, let alone mandate, interstation drying. In fact, the Gebrauchsmuster does not indicate how one would dry the flexographic ink prior to printing lithographic ink on tope of it. The mention of drying in the last paragraph is simply insufficient. If attempted to be practiced on the opaque white mentioned in the Gebrauchsmuster, such a press containing an interstation flexographic tower would produce disastrous results – a mess. As applied by the device described in the Gebrauchsmuster, the process of Claim 5 or Claim 6 would be inoperable.

10. With the foregoing difficulties, including the lack of a teaching equivalent to WIMS '976 and the lack of a sufficient teaching of interstation drying, the Gebrauchsmuster does not place Claims 1-87 of the pending reissue application in possession of one skilled in the art as of August 1995, let alone July 1993. Said another way, if one were to read the Gebrauchsmuster claims in July 1993 or August 1995, one of skilled graphic arts knowledge would not be in possession of the Davis-Williamson '363 invention.

11. I note in passing from my former review of the Jesse Williamson, Gary Doughty and Harry Bowyer declarations, that Gebrauchsmuster G 93 05 552.8 Fig. 1, the substance of the last two paragraphs of the specification of said Gebrauchsmuster and Claim 5-6 of said Gebrauchsmuster clearly came from Jesse Williamson's statements to MAN-Roland at the end of May 1992.

The undersigned Declarant stated further that all statements made herein of Declarant's own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Raymond J. Prince

Date: 12/5/2000